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RELATIONSHIPS & CAPITAL IN LIVING LEARNING COMMUNITIES:
A SOCIAL NETWORK ANALYSIS

DISSERTATION

A dissertation submitted in partial fulfillment of the
requirements for the degree of Doctor of Philosophy in the
College of Education
at the University of Kentucky

By
Leslie Nicole Woltenberg

Lexington, Kentucky

Director: Dr. Jane Jensen, Professor of Educational Policy Studies & Evaluation

Lexington, Kentucky

2014

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ABSTRACT OF DISSERTATION

RELATIONSHIPS & CAPITAL IN LIVING LEARNING COMMUNITIES: A SOCIAL NETWORK ANALYSIS

This study was designed to explore the possible connections between student peer relationships and individual students' roles in a network as it pertained to outcomes such as self-reported academic achievement and personal satisfaction with the first year of college. The research question directing this inquiry is: How does a student's role within a residential community of peers relate to success in college? Social network analysis was employed for examination of individual engagement within the context of a larger community.

The vast learning community literature tells an interesting story: 1.) a history of co-curricular peer learning environments, 2) a tradition of research intended to assess the value of these programs, 3) a body of literature that provides theoretical explanations for why learning communities should work. The gap in the literature is found regarding what happens *within* the communities. To learn how individuals within community learn from one another, community of practice was utilized as a framework in this mixed-methods approach to examine the influence of relationships, and exchange, acquisition, & development of social capital within a living learning community

While this network study indicated that popularity, relational ties to staff, and being someone sought-after for advice were not statistically significant predictors of higher GPA, the network analyses confirmed strong network density, cohesion, and proper structure for ideal capital flow. The results of this study confirm that this community is effective in establishing familiarity and even more so, providing an environment that fosters friendships among participants and staff. Furthermore, students developed the ability to construct knowledge alongside their peers. Given the density and relation-rich nature of this community, this positive environment is able to foster more complex and self-authored levels of meaning-making for the students involved. Building this scaffolding facilitated student development, which effectively created a student transformation from dependence on external authority to self-authorship. This study confirmed that the primary goals of a learning community have been met: a group of strangers developed into a network of friends who reap social and academic benefits by

virtue of being together in a shared and successful living learning community environment.

KEYWORDS: Living Learning Communities, Social Network Analysis, Social Capital, Network Structure, Community of Practice

Leslie Nicole Woltenberg

Student's Signature

7-10-2014

Date

RELATIONSHIPS & CAPITAL IN LIVING LEARNING COMMUNITIES:
A SOCIAL NETWORK ANALYSIS

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CHAPTER 1: INTRODUCTION

In recent years, learning communities have evolved from a higher education trend to residential campus staples at small liberal arts colleges and research universities alike. The evolution of residence halls on college campuses provides an interesting story of progression from mere brick and mortar to centers of innovation, research, dynamic relationships, and active involvement with the campus and community. Learning communities were born out of one of the many attempts at undergraduate education reform and is a model that serves as effective way to engage and support student success (Smith, MacGregor, Matthews, & Gabelnick, 2004). There is a growing amount of resources and research that supports student learning and specific to the experience of student involvement in residential learning communities (Smith et al., 2004). Proponents argue that learning communities provide a new way for students, staff, and faculty alike to engage in the life of the institutions. Such communities are reflective of a conceptual shift of moving from a teaching to a learning paradigm, emphasizing the value of the co-curricular, collaborative learning, and student development (Smith et al., 2004).

Students involved with learning communities are more likely to persist through graduation (retention), attain greater academic success, connect with peers and develop social networks, communicate with faculty and staff, and overall claim to have more successfully made the transition from secondary education to post-secondary (Tinto, 2003). Critics claim that the networking and benefits of involvement with learning communities are not so different from the skill sets developed when students seek opportunities independently (Georgia Institute of Technology, 2000; Terenzini, Pascarella, & Blimling, 1999; Pemberton, 1996). However, these claims are largely

based on isolated studies with no indicated evidence of broad applicability nor reasonable amount of assessment or data. The bottom line is remarkably positive in terms of learning community literature for student relationship-building and success. The challenge is in finding new and innovative ways to learn about the network development among students in these communities. Learning more about relationships, roles, and dynamics within such communities not only contributes richly to the existing literature, but also helps us advance the work of learning communities in higher education as a whole and (perhaps most importantly) allows us to serve and support students in more intentional ways.

This research furthers our understanding of the social and academic implications of student peer relationships and social capital flow within a living learning community. This study seeks to examine the network of roles and relationships among a first-year residential learning community through the lens of community of practice, including an analysis of both academic and social measures. Specifically, this dissertation will study student peer relationships to better understand the connection between network structure composition & success in college. Furthermore, this research expands our understanding of how students construct knowledge within academic and social peer relationships potentially contributing to positive educational outcomes.

For practitioners, this study demonstrates how social network analysis may be applied to their own campus communities (residence halls, student organizations, classes, etc.) in order to learn more about the value and impact of relationships within such networks. The theory, method, and results of this study can help faculty and administrators to create more educationally hospitable collegiate environments for

undergraduates that stand to benefit critical measures such as GPA, retention, and graduation rates.

Learning community literature references components and general ideals of social networks, often without calling it by name. Tinto emphasizes a supportive network of peers as a critical component to effectively bridge the gap for students between academic and social experiences (Tinto, 1998). A social network can provide important opportunity for examination of individual engagement within the context of a larger community. The emphasis on relationship among those involved in such communities makes for a perfect use of social network analysis (SNA) to uncover more about the interactions within a specific learning community, specifically among the students themselves. Meaning can be made of the relationships among students and with other learning community program stakeholders in addition to consideration of the environment that these networks are nestled in (both physical and psycho-social environments). Network analysis provides a method to map social ties within a community and compare survey topics (i.e. student satisfaction and/or participation in a learning community) with placement within the network structure. The visualization, or mapping, of such data provides insight into community dynamics. The process of academic and social relationship development (student-to-student) can be explored relative to factors such as social interaction, campus involvement, and academic success.

Although it is not typical student affairs (nor higher education) practice to speak in terms of social networks (i.e., nodes, networks, relational ties, etc.), these dynamics are a part of the very environments examined in the literature. Learning community environments influence the student experience students including development of

personal relationships, perspectives on success, and exchange/acquisition of capital; additionally, these personal interactions are not easily obtained by large-scale quantitative studies.

Learning community research has been done under many methods (though largely leaning more toward qualitative) and network analysis provides a new perspective.

Network analysis shifts focus to the relationships among the students and also relationships with key stakeholders. The varying measures and types of these relationships provide additional meaning and insight to the interactions and outcomes of a given community. Network analysis provides a measure of the relationships that hold these groups together. Ultimately, network analysis creates an opportunity to learn more about these communities that have proven to be such a fascinating population of study and topic of interest on so many campuses today.

RESEARCH QUESTION & CONTEXT

My interest in studying the residential community population in higher education is to uncover more about the interactions between students that create a pattern of ties defined as a social network (Coleman, 1988). This study is designed to explore the possible connections between student peer relationships and individual students' roles in a network as it pertains to outcomes such as self-reported academic achievement and personal satisfaction with the first year of college. Thus, the research question directing this inquiry is: How does a student's role within a residential community of peers relate to success in college?

Given that success can be defined in any number of ways, for the purposes of this project the term "success" will be assessed specifically within the context of network

analysis and academic achievement. Success, for the purpose of this study is measured in two ways: 1.) Success in terms of the traditional definition of academic success as self-reported grade point average in defined term (first semester of college); and 2.) Success in terms of number and type of relational ties within the specified network (learning community).

The significance of this study resides in the unique way in which it allows us to learn more about student success in terms of relationships and roles from a network perspective. While this study is largely exploratory in nature, it utilizes community of practice framework with social network analysis as a method of exploring the impact of relationship development and integration in a group of peers. This type of specialized study is the mechanism by which network analysts generate data about organizations or, in this case, examine of a group of individuals within a specified community.

The network survey utilized here provides the structure needed to assess student perspectives about their relationships, self-reflections, as well as their perception on success as first-year college students. This particular study took place within a residential learning community at a public, 4-year university in the southern portion of the United States. The format of this study can easily be adapted to examine other student group scenarios in educational settings to learn more about influences, stresses/strains, supports, and other environmental attributes impacting the group. Since relational and personal reflection data can be challenging to capture and quantify, network analysis mines this data in a way that palatably presents to administrators, practitioners, and scholars. While the *specific* results of this study may have a limited applicability, this contribution does

provide a conceptual model for a new and creative way to explore student network and relational impact in higher education.

DEFINITIONS

For the purposes of this research, several keywords or phrases are regularly utilized and require operation to ensure clarity within the text. In addition to the key terms provided below, several concepts relative to the chosen methodology are also operationalized for further clarity. Please see below for terms and the definition as applies to this work:

- It is not uncommon for student affairs professionals and residence life and/or housing professionals are referenced as one in the same in educational literature. Notably, residence life professionals are tied to the student affairs division or department in most higher education structures. Referencing “**Student Affairs**” is intended to encompass the work of residence hall staff for intentions of this document.
- It is important to note that such organized student groups often go by a variety of names: living learning communities/centers/programs (LLCs/LLPs), residential cohorts, residential colleges/communities, freshmen interest groups (FIGs), first/second year experiences (FYE or SYE), and so on. From this point forward, the term “**learning community**” as referenced in this document refers to residential learning communities where students share a living experience in a residence hall setting on campus and have both academic as well as social connections.
- A **community of practice** is a set of relations among people that provide opportunities for learning. Lave and Wenger refer to this group and social

approach to learning as legitimate peripheral participation (Lave and Wenger, 1991).

- Broadly, **social capital** is defined as the “sum of resources, actual or virtual, that accrue to an individual or group by virtue of possessing a durable network of more or less institutionalized relationships of mutual acquaintance and recognition” (Gargiulo and Benassi, 1999, p. 298). Due to the vast amount of research and literature on the topic of social capital, focus here is specifically on the concept of social capital as it relates to social networks and the exchange of knowledge (Burt, 2002).
- **Social networks** are formation and patterns of ties between individuals in a specified group. The nature of the ties and the influences on the individuals include social context, such as norms trust, social networks, etc. (Coleman, 1988).
- In a social networks, a unit (most typically an individual person) is typically referred to as an “**actor**” and is represented as a **node**. A relationship between nodes is represented as a linkage, tie, or a **flow** between these actors (Martino & Spoto, 2006). Speaking of an individual may be referenced as “node” or “actor”.
- **Network structure**: the overall formation and pattern of ties between nodes/actors defined as frequency of interaction or type of relationship (friendship, study buddy, classmate, etc.)
- **Strong tie**: defined as the relationship between two nodes/actors that is defined as having a significant or multiple purpose (i.e. “close friend”)

ORGANIZATION OF THE STUDY

Chapter 1 has outlined the research question, emphasizing the significance of using social network analysis to examine the relationships between and individual roles of students in a college residential learning community. Chapter 2 serves as a concise and relevant review of literature most important to contextualize this research. This chapter provides a discussion of the most relative works specific to my research, by providing a conceptual perspective and compelling rationale for this study. Chapter 3 provides a discussion of the research design, methodology utilized, and instrument distributed for collection of original data. Information regarding my data and procedures for the survey are reviewed in detail in this chapter. Chapter 4 reports the findings and interpretation of the survey. Chapter 5 discusses the importance of the survey results through summary, limitations, and suggestions of future studies.

CHAPTER 2: LITERATURE REVIEW

The research question posed for this study touches upon three primary areas of scholarship: (1) historical relevance of residential communities in higher education, (2) learning communities (both models of and contemporary applications) and (3) literature pertaining to the theoretical framework of communities of practice (including contextual information regarding social capital & social networks). The enormity of literature available in each of these areas makes a comprehensive review unrealistic for the purposes of this study. What this chapter provides, however, is a review of the most relevant work in each conceptual area as it pertains to my research question.

HIGHER EDUCATION & RESIDENTIAL COMMUNITIES: HISTORIAL OVERVIEW

“The heritage of learning communities for students can be traced to experimental undergraduate colleges... so did the residential colleges modeled after the residential colleges at Harvard and Yale, which were in turn modeled after the residential colleges at Oxford and Cambridge”- (Lenning & Ebbers, 1999, p. 9).

Until the early 1900s, Oxford and Cambridge were often perceived as the ideal collegiate experience. These institutions addressed the concerns of increased enrollment and an enhanced student experience by offering the residential college setting.

Residential colleges, at that time, were generally defined as academic societies made up of students and faculty. The committee on Higher Education in Great Britain supported the concept of scholarly communities and even acknowledged the value of embracing the co-curricular. A report published by this group articulated, “... institutions of higher education are not merely places of instruction... they are promoting the social life of

university and colleges” (Adelman, 1969, p. 51). This incorporation of the academic and social aspects of collegiate life was a contributing factor that helped Oxford and Cambridge retain their unified spirit throughout years of change.

In the United States, Woodrow Wilson served as a leading figure in the revival of the collegiate ideal at Princeton and emphasized the need to consider the multiple facets of student life (Ryan, 1992). Wilson looked toward English Residential Colleges for inspiration and noted, “The ideal college... should be a community, a place of close, natural intimate association... of teachers with pupil, outside of the classroom as well as inside of it” (Ryan, 1992). Early residential college plans often included a structure which suggested that each college have its own curriculum, classrooms, dormitories, and small resource centers or libraries (Duke, 1997).

With the Ivy Leagues leading the way, by the 1930s approximately forty residential colleges opened their doors at American institutions. In 1929, Harvard University’s housing plan garnered much attention. The Harvard houses had objectives to foster coherent social life, facilitate contact between undergraduates, facilitate interaction between faculty and students, and to create an intellectually stimulating atmosphere (Duke, 1997). Clearly, this was a moment in time that marks the emergence of a more modern-day residence life experience.

The elitist clubs of previous Harvard and Yale were quickly becoming surpassed by campus activities and organizations that were open to a far less restricted demographic of student (Duke, 1997). Though it would be many more years of struggle, the residence halls would continue to evolve throughout the 20th century. The Oxbridge-style residential college trend began to fade in the 1980s with competition from private off-

campus housing construction and increased part-time and commuter students; however, the lasting impression of the Oxbridge model would impact residence life in higher education for many years to come.

At the same time that the residential college was evolving in the US, the particularly American phenomenon of general education in the first two years was also evolving resulting in a distinctly American undergraduate experience. Alexander Meiklejohn was driven to address the perceived disjointed and impersonal nature of education. Meiklejohn's drive for greater educational continuity resulted in the development of a two year curricular program with a primary goal of preparing students for their role as contributing citizens in society (Meiklejohn, 1932). His focus on building common interest among students manifested in the 1920s. Hosted at the University of Wisconsin in 1927, this program is known as Alexander Meiklejohn's Experimental College. Notably, theorist Vincent Tinto points to Meiklejohn's work as the birth of learning communities (Tinto, 2003). The Experimental College emphasized curricular and teaching continuity as well as encouraged learning through personal experience. The Experimental College model did not withstand the challenges of the Great Depression and lack of acceptance by the greater University of Wisconsin community; however, the concept of melding the living and the learning environments would serve as inspiration to many theorists and programs into the future (Matthews et al., 1997).

A contemporary of Meiklejohn was John Dewey, a psychologist and philosopher who helped popularize the concept of student-centered and active learning. Unlike Meiklejohn, Dewey focused more on a model of education built on the individuality of

each student and purposefully engaging the learner (Smith et al., 2004). His work is also heralded as a key influence on the development of contemporary learning communities. Dewey's ideal educational environment was more of a shared learning experience where the teacher was considered a partner in a collaborative relationship, less of an external authority, and more of a leader of group activities. The theme of collaboration consistently emerges in learning community research, most notably in Tinto & Goodsell's 1994 study as one of four main outcomes of learning community participation: 1.) participation in a small-group setting does help students form a supportive community, 2.) the courses linked to these communities were often taught in unorthodox manners (out of class experiences, field trips, etc.) – permitting students to more fully engage in the learning process, 3.) students became more persistent in academic settings, and 4.) students in these communities become further involved in the life of the college and are more engaged outside of the classroom (Tinto & Goodsell, 1994).

Dewey's progressive school concept envisioned learning as an open-ended inquiry process, allowing for cooperative and collaborative approaches with an emphasis on the value added by diversity (Smith et al., 2004). Although, Meiklejohn would later point out that Dewey's pragmatism failed to "...provide the intellectual synthesis needed to balance individual autonomy and institutional authority in a democratic society" (Smith et al., 2004, p. 28). Dewey's work influenced countless others (including Pascarella & Terenzini) to continue to work on topics such as social construction of knowledge, developmental perspective, and collaborative learning approaches to education (Smith et al., 2004).

LEARNING COMMUNITY MODELS & CONTEMPORARY APPLICATIONS

John's Dewey's influence on education environments and Meiklejohn's early work with the Experimental College gave way to the developing field of learning communities and thus a number of valuable theorists, literature, and enhanced learning community models emerged. A widely-used and broad definition of a learning community, developed by prominent theorist Alexander Astin, articulates: "Such communities can be organized along curricular lines, common career interests, avocational interests, residential living areas, and so on. These can be used to build a sense of group identity, cohesiveness, and uniqueness; to encourage continuity and the integration of diverse curricular and co-curricular experiences; and to counteract the isolation that many students feel." (Shapiro & Levine, 1999, p. 8).

Shapiro and Levine provide one of the most comprehensive explanations of learning community purpose: "One of the main purposes of learning communities is to create more seamless learning environments that encourage students to make connections between subject areas, between in- and out-of-classroom learning experiences, and between each other and faculty members" (Shapiro & Levine, 1999, p. 13). Persistence to graduation and other definitions of success emerged early in the literature as a key benefit to student involvement in learning communities.

The influences of various theorists and literature can be found within the multitude of learning community models. The variety of learning community models is also reflection of a conceptual shift of moving from a teaching to a learning paradigm (Smith et al., 2004). Despite the specific model followed on any given campus, many of the four factors identified by researchers as important to student learning/success are

interwoven among the variety of learning community structures. These four important factors include: 1.) Students learn concepts better when topics overlap in classes; 2.) Students learn information better when it is reviewed/studied with peers; 3.) Students learn better when they are actively involved in the learning process; and 4.) Students are more likely to persist through graduation if personal connections are made with students and faculty (Jaffee, 2004). Emphasis on relationships is imperative in such programs as the most critical issue regarding campus environments and student involvement is creating a sense of belonging (Kuh et al., 1991). Touching upon these topics, Lenning & Ebbers as well as Shapiro & Levine developed the most widely referenced contemporary learning community models cited by more recent higher education programs.

Lenning and Ebbers' define learning communities by four categories: curricular, classroom, residential, and student type (Lenning & Ebbers, 1999). Similarly, Shapiro and Levine's work reiterates that learning communities represent a major transformation in how campuses think about teaching and learning (Shapiro & Levine, 1999). The emphasis on collaborative/co-curricular learning and Astin's involvement theory had a clear influence on these models. The components of these models emphasize the importance of relationship development, academic support and connection, activity/programmatic involvement, and value of the physical space associated to such programs (Shapiro & Levine, 1999; Lenning & Ebbers, 1999). The list below reflects a blended typology of Lenning and Ebbers as well as Shapiro and Levine's models:

1.) Curricular learning communities: focus is exclusively on curriculum coordination as the link. Classes linked to learning communities commonly host 25-50 students and increase the likelihood of "small-group interaction, student participation, and a closer relationship with faculty members" (Jaffee, 2004, p. 6). The high level of faculty and staff interaction with learning communities creates an environment that is more

intellectually supportive. Learning communities with linked classes helps students become more academically focused by providing more time-on-task (Hurd & Stein, 2004). Example of such communities can include: freshman interest groups, linked courses, course clusters, federated learning communities, and coordinated studies. (Lenning & Ebbbers, 1999).

2.) **Cohorts:** focus is on linked courses and additional social activities for the community and typically there is no shared residential living space. This category is noted by cooperative and collaborative learning that extends beyond a sterile definition of a class experience including varied teaching formats and group activities (Lenning & Ebbbers, 1999). Coordinated study or cohort programs serve to engage students into the learning process and more collaborative work among students, in contrast to traditional classroom settings. Cohorted classes improve student motivation, interaction, and achievement; likewise, faculty members are afforded the opportunity to “sharpen their teaching edge, broaden perspectives on modern issues, and renew enthusiasm for sharing the specialized knowledge of one’s field” (Finley, 1995). Many cohort models host multiple classes organized through a common interdisciplinary theme and also incorporate multiple faculty members meet with larger groups of students for generally a few hours a day each day of the week in social or academic settings (Lenning & Ebbbers, 1999).

3.) **Residential learning communities:** focus is on activities taking place within the residence hall(s) where the students reside and may or may not include linked courses. This category combines the structural and the functional, linking students’ place of residence to an opportunity for enhanced learning in the college experience. Community concept may be an academic discipline (such as major, college, academic program such as honors, or professional goal) or may be personal interest driven (Lenning & Ebbbers, 1999). These communities tout an incredible value-added from offering students quality residential programming to enhance involvement. The programming developed by residence hall staff also contributes to the intellectual development and cognitive gains of learning community students (Terenzini et al., 1996).

The aforementioned learning community models transcend time and continue to inspire contemporary communities due to the strong research supporting their value.

The most widely referenced historical, conceptual, and philosophical context of contemporary learning communities comes from *Learning Communities: Reforming Undergraduate Education* (Smith et al., 2004). The authors penned a prior volume

(*Learning Communities: Making Connections*) in 1990 that framed much of the early emergence of the learning community movement. The latter work (*Learning Communities: Reforming Undergraduate Education*) harnesses the authors decades of experience in the field by employing personal feedback, empirical studies, theoretical frameworks, and historical context. This particular text has become the go-to handbook for learning community professionals and is often regarded as the foremost contribution for establishing the learning community movement in American higher education (Shapiro, 2006). Not only is this work heralded by global leaders in the learning community movement but also well regarded by acclaimed theorists Alexander Astin & Vincent Tinto.

Wide referenced excerpts from this text include the five core practices and campus transformation narratives. “Learning communities can be a versatile and effective approach in enhancing student learning and student success, promoting curricular coherence and faculty revitalization, and in some institutions, become a key element in institutional transformation” (Smith et al., 2004, p. viii). The five core practices of successful communities are: community, diversity, reflection and assessment, integration, and active learning (Smith et al., 2004). Often, the most successful learning communities are coordinated by program or academic study and most are led by a small group of devoted learning community champions (Smith et al., 2004). Time after time, intentionality is emphasized as a critical component to planning, assessing, and sustaining learning communities.

REVIEW OF LEARNING COMMUNITY OUTCOMES RESEARCH

Academic achievement for learning community students has been studied on numerous college campuses, most often via the College Student Experiences Questionnaire. The findings of this study indicated that learning community students had significantly higher levels of success markers across the board than did students in traditional (i.e. non-learning community) residence halls (Lenning & Ebbers, 1999). Tinto found that three key themes consistently emerged from the learning community studies: 1.) supportive peer groups, 2.) shared learning/involvement, and 3.) and persistence (Tinto, January 1998). Advanced moral reasoning, gains in critical thinking, and development in other areas (aside from coursework and related class activities) are identified as positive gains in personal growth from living in the residence hall setting (Terenzini et al., 1996,). Positive findings such as these help make a case for continued support for learning community programs.

The vast learning community literature tells an interesting story: 1.) a history of co-curricular peer learning environments, 2) a tradition of research intended to assess the value of these programs, 3) a body of literature that provides theoretical explanations for why learning communities should work. The gap in the literature is found regarding what happens within the communities. Learning outcomes are an obvious place to begin peeling back the layers of learning community programs to better understand the intended results of grouping individuals together for a shared experience. Establishing learning outcomes centered on student development requires a shift in focus from program providing (program/organization/task-focused) to partnership engagement (focus is on developing students who are engaged in department/program). Focusing on the

relationships, rather than tasks, brings an opportunity to enact student development theory in practice.

The learning that occurs among students within communities knows no structural boundary. Students involved with learning communities obtain higher academic achievement, better retention rates, connect with peers and develop social networks, communicate with faculty and staff, and overall claim to have more successfully made the transition from secondary education to post-secondary (Tinto, 1998; Lenning and Ebbers, 1999). Learning community literature has largely been framed through Tinto's student retention model. Given that "interactions among different individuals within the academic and social systems of the institution lead individuals of different characteristics to withdraw from that institution prior to degree completion.", learning communities must be intentionally designed as programs and spaces where student academic and social success is paramount (Tinto, 1987, p. 113). Contemporary studies continue to reinforce and extend these classic LLP literature and research findings. In one study completed at the University of Texas at El Paso revealed a contemporary example of the retention rate disparity between LLP participants and non-LLP students. The student retention rates for learning community participants were 80 percent for LLP students compared with 68 percent for those not involved in LLP (Price, 2005).

Not only do these studies validate the work of higher education professionals who support such programs, but it also provides a scholarly source of assessment and literature to which academic affairs professionals (faculty and administrators, in particular) can relate and find meaning in the work that is being done within residence halls. When residence halls can prove an impact on increasing the academic success of students, a stronger case can be made for the various forms of support (Edwards and

McKelfresh, 2002). “Students learn by being engaged... and engagement also requires considering how an institution allocates its resources and organizes services and learning opportunity to encourage students to participate in and benefit from such activities” (Whitt et al., 2008, p. 236). The goal of increasing student learning and retaining students are two critical components to gain both faculty support and budget allocations.

Consistently, both in the literature and often in practice, the significance of the first year of college for a student is emphasized. These statements are not without supporting evidence. The freshman year of college has the greatest impact on students’ intellectual development and students who live in residence halls during that first year also boast higher GPAs at every class level versus their off-campus counterparts (MacGregor & Smith, 1992; Edwards and McKelfresh, 2002). “Students living in residence halls make better grades, are more motivated to complete degree programs, have better attitudes about their college or university, and are more involved in social and academic activities on campus” (Kuh, 1981, p. 15). Additionally, retention data provides an indicator of student performance, but does not do justice to the multidimensional development evident in residential learning community students (MacGregor, 1991). Additionally, these residential freshmen students are also more likely to apply the classroom knowledge with peers in settings outside the physical classroom (Curtin, 2001). This interaction with peers in the residence hall resonates further the positive impacts on the many aspects of college life.

Even more specifically than just students living in residence halls, studies of students involved in residential learning community programs contribute richly to the value of residence halls to higher education as a whole. Learning community students

often have higher GPAs than their peers not involved in such communities, these students also report regular interactions with faculty and peers (Edwards & McKelfresh, 2002). Additionally, studies at University of Oregon and University of Washington have shown that community students were well adjusted to campus living, more involved in extra-curricular activities, and spoke to greater general satisfaction with their undergraduate experience (than non-learning community participants) (Matthews et al., 1997). Tinto's 1994 study demonstrated that learning community students persisted at a higher rate and were more involved in learning with peers (Curtin, 2001). Learning communities bring in partners, connections, resources, and learning opportunities which help prepare students for life beyond the date of graduation (Lenning & Ebberts, 1999). Preparation for challenges of leadership and life are positive indication of the personal growth attained by students involved in these residential environments.

Many researchers discuss how residential student communities contribute to greater achievement and performance in undergraduate education as well as the personal development which takes place for the students involved. Specifically, MacGregor and Smith emphasized that the multidimensional development that takes place in learning community environments cannot be simply captured via students retention data alone (1992). The college experience provides a student with the opportunity to "...find not just a vocation, but also himself... the college must seek to create an atmosphere in which students are supported in their full personal growth... promoting a student-centered vision of education that builds character and sharpens the mind" (Ryan, 1992, p. 35). Application of theory alone does not manifest into positive outcome-producing environments.

A logical concern of creating homogenous groups lie within the unintended consequences that can emerge. Issues such as group-think, class consciousness, access, and exclusivity have been superficially explored in learning community literature. Criticism for learning communities is challenging to identify in the literature among the robust praises and positive assessments. However, there has been such a glut of data on the first year experience that a movement has emerged in practice and in the literature to rally support for second-year experiences and beyond. Acclaimed theorist Vincent Tinto reinforces that the support should not end with the first year experience, but that these students will need individual guidance and academic advising throughout their undergraduate careers (Tinto, 1998). Valuable subsets of learning community literature include academic achievement, learning outcomes, as well as the variety of relationships that emerge (both among peers and with stakeholders) including partnership development and support.

The notion of integration, or connectedness, is a theme that persists throughout learning community research over time. Vincent Tinto's work laid the groundwork for the value of social connections, academic support, and a sense of connectedness to the campus community (Tinto, 1998). Tinto, via his student departure theory, also suggested that students are more likely to persist if they have opportunities to integrate into the academic and social realms of the institution (Tinto, 1987). Students who are involved in the residential facilities in which they live are among the students most likely to persist to graduation since they are making the most salient connections to their institution (Astin, 1984). Connectedness to one's institution is a critical piece in learning community literature.

Extending the work of Tinto & Astin, learning communities research further emphasizes that these programs should "...increase students' development, achievement, and persistence through encouraging the integration of social and academic lives within a college or university and its programs, and through quality interaction with peers, faculty members, and the campus environment" (Lenning & Ebbers, 1999, Pg. 49-50). These partnerships in higher education provide the support necessary to create seamless learning environments for students. "Seamless" can be defined as learning environment(s) with clear educational purpose, policies, and practices (Whitt et al., 2008). Carefully developed and executed classroom lesson plans are essential and community-fostering residence hall programs are significant; however, it is the convergence of both the "in" and "out" of class experience that becomes vital to creating environments where students can thrive. "Student affairs professionals attempt to make 'seamless' what are often perceived by students to be disjointed, unconnected experiences by bridging organizational boundaries and forging collaborative partnerships with faculty and others to enhance student learning" (*The Student Learning Imperative*, 1996, Characteristic #3).

The student-to-student relationship also adds considerable value to the higher education experience. Peer group relationships influence both affective and cognitive development (*The Student Learning Imperative*, 1996). The peer group served a particularly important role in Astin's work, noting that student-to-student interaction can produce some of the strongest and certainly the most widespread effects on student development (Astin, 1993). The opportunity to live with peers in a residence hall setting is one example of where students can "...exchange with one another, internalize the

information, take the measure of what rings true, relate it to their experience and intuitions, and access how it has meaning in their lives.” (Ryan, 1992). Likewise, students who live in residence hall communities report feeling more support from peers, see greater connections between classes they take, feel positive about their academic experience, and appreciate the diversity of perspectives that come with living alongside a variety of other students (Curtin, 2001). The value of sharing an experience with others positively impacts both the social and academic experiences for these students.

Involvement of residence hall staff, other student affairs professionals, faculty members, and even campus administrators provide the necessary structure and support to give enhanced meaning and service to a community. In-hall events provide the perfect opportunity to help create more seamless learning environments. The staff who support these residential opportunities are challenged to create new ways to encourage student involvement, development, and sense of belonging. Residence hall staff members (including professional and student staff) are considered educators who engage in a form of social engineering to synthesize academic and extracurricular activities for students in these networks (Blimling et. al, 1981). Residence halls provide powerful learning opportunities for students because they put faculty members in situations where intellectual inquiry can be modeled in a non-academic setting (Kuh et al., 1991).

Involving faculty members in residence hall communities, programs, and other activities helps to forge a stronger partnerships between academic and student affairs. This collaboration pays dividends for the student experience. These collaborations bring the best of both academic and student affairs together by creating interdepartmental relationships that combine resources to address the needs of students (Whitt et al., 2008).

Student engagement in such activity is indicative of community development, which is linked with student persistence and educational attainment (Kuh et al., 1994). Astin emphasized peer influence among students as a key to success, noting that a students' active engagement in the life of the institution such as involvement in campus activities was a factor to persistence (Astin, 1993). Ultimately, relationships are the key to student development, student success, and positive student experiences.

The benefit of relationships within learning communities extends even beyond academic support and social interaction, as it can also impact an individual's cognitive development. Terenzini states the "most of the influence of learning community on students' intellectual and cognitive growth appears to occur indirectly... not through the direct interpersonal interactions with peers... but rather the influence those interactions have on students' various dimensions of intellectual and cognitive development" (Terenzini et al., 1996, p. 152). The importance of the student-to-student interactions in these communities can be further explained with the concepts of social network theory and analytic framework. Ultimately, the importance of student relationships, invested stakeholders, connected curriculum, common interests, and physical space (i.e. residential setting) all serve steadfast functions in the many learning community models referenced by more contemporary incarnations.

In summary, learning communities have a rich history rooted in the early residential college models and have proven to be good for students. Countless studies on best practices, goals, learning outcomes, and models for successful programs exist in the literature. The assumption is that learning communities are good for students due to the influence on their cognitive development and development of academic capital which

help navigate the collegiate experience; however, little is known about *how* this happens. To learn how individuals within community learn from one another, community of practice can be utilized as a framework to better understand the influence of relationships and exchange, acquisition, & development of capital.

THEORETICAL FRAMEWORK: COMMUNITIES OF PRACTICE

Communities of Practice

Etienne Wenger and Jean Lave are the leading scholars of community of practice literature. Communities of practice are generally defined as groups of people who share a concern or a passion for something they do and interact regularly as a group (Wenger, McDermott, Synder, 2000). Simply stated, a community of practice (CoP) is a set of relations among people that provide opportunities for learning. Lave and Wenger refer to this group and social approach to learning as legitimate peripheral participation (Lave and Wenger, 1991). Key to understanding concepts of and related to communities of practice, is that the notion of the individual is not lost in the context of the group of relationships. The assumption is made that individuals have varying interests, viewpoints, and make different types of contributions to the overall group dynamic (Lave & Wenger, 1991).

These social structures focus on knowledge sharing and acquisition as well as the formation of relationships among individuals. The individuals that contribute to a community of practice bring diverse perspective, skills, and knowledge to the group. These contributions facilitate knowledge sharing and the process of learning in a social setting, issues that are paramount in understanding the value of communities of practice.

Communities of practice can emerge for any variety of reasons: shared expertise, passion for joint enterprise, way of maintaining connections with peers, or even in response to change (Wenger & Snyder, 2000). The beauty of a community of practice perspective is that a two-fold benefit is received: knowledge is generated and/or shared as well as a visual map to display how a sense of community among the members is created (Wenger & Snyder, 2000). Additionally, the ways that opportunities for members to serve in different learning roles develop within a given community can be examined in group and individual context.

There are three fundamental characteristics of communities of practice: domain, community, and practice. Domain represents the area of knowledge that brings the network together; this is the core of what unites the individuals. Community is representative of the individuals that form the network based on their shared domain of interest. Practice is the actual body of knowledge and information that is shared by members of the network. It is important to note that a community of practice as defined by CoP scholars is not just a community of interest; communities of practice bring together people who are involved in doing something as a function of being together (Wenger, 2004). It is the combination of these three fundamental characteristics that give rise to the sharing and management of knowledge, or capital.

Thinking of knowledge management in terms of communities of practice requires a paradigm shift: from focusing on a task or project to be completed, to focusing on the knowledge sharing and empowerment. Regardless of the reason for formation, at the core of a community of practice is a central group of participants who have a common interest and willingness to interact with others in intellectual and social ways (Wenger &

Snyder, 2000). Additionally, members of a community of practice will inevitably possess varying degrees of knowledge and experience to share. Lave and Wenger's work has been expanded to include an exploration of the roles of novices and experts within a community. These roles feed into an "epistemology of learning a craft that involved increasing degrees of social participation and practice" (Smith et al., 2004, p. 105). The idea is to cultivate knowledge and the diversity of members feeds this environment.

Common among communities of practice is an objective to encourage learning, information flow, and meaning-making among the individuals (Wenger et al., 2001). Communities that promote effective knowledge creation and transfer reap significance efficiency and effectiveness benefits as opposed to more disparate groups (Lave & Wenger, 1991). Consideration must be given to enhancing the communication and relationship-building among community members to prevent flow strain from isolating the individuals. In most cases, the domain and practice of the group must remain a fluid and flexible concept to prevent silo effects and peripheral isolation (Kilduff, 1992).

The community of practice literature gave way to new concepts as well as relationships to existing studies. Peter Haas introduced the concept of epistemic communities in 1992 in his work exploring international organizations. Haas defines epistemic community as "a network of professionals with recognized expertise and competence in a particular domain and an authoritative claim to policy-relevant knowledge within that domain or issue-area" (Haas, 1992, p. 3). Epistemic communities serves as an expansion of communities of practice since Haas used this concept as a method to examine the roles that networks of knowledge-based experts have on a given problem, topic, or task. (Haas, 1992). This work also clearly relates to that of social

capital, embeddedness, as well as brokerage and closure due to the significance of the exchange of knowledge between individuals in a given network (Burt, 2002 & 2005; Coleman, 1988; Putnam, 1995; Gargiulo and Benassi, 1995).

Knowledge Acquisition, Transfer, & Flow

Similar to Haas' work, Daniel Wegner contributed the concept of transactive memory, a concept that speaks to knowledge acquisition, transfer, as well as flow. Group-think or a shared sense of opinion, knowledge, and/or perspective can be quite pervasive among communities of practice. Wegner sought to expand beyond group think to explore how knowledge is shared and expertise is developed among individuals in a connected group. Wegner's transactive memory touches on the notion that individuals in community can have an unspoken commitment to remember things in their respective areas of expertise (Wegner, 1985). When this division of labor emerges in groups, it can make for less well-rounded individuals because the expert is the one responsible for certain knowledge. In examples such as student learning communities of practice, knowledge sharing can have both a positive and negative implications.

Knowledge sharing can happen in a variety of methods. Community of practice literature emphasizes the value of informal conversation among members. Julian Orr made this concept particularly popular in the mid-1990s with his narrative on copy machine technicians and how they shared skills, tips, and advice through the formation of a community of practice (Orr, 1996). Orr found that the Xerox technicians spent considerable time in community and conversation; these discussions provided an

opportunity to exchange work stories, repair methods, and working in pairs or groups to address issues.

By studying groups of people who gathered informally to share work-related problems and to enhance their skills by learning from others, Wenger identified communities of practice as a critical place for learning and community-building to coexist (Smith et al., 2004). Much of the community of practice literature references Vygotsky's works regarding views of psychological processes directly tied to social activity and knowledge transfer or acquisition (1978, 1986). Such communities provide fertile ground to cultivate knowledge both as individuals but also as productive professionals. In higher education, both formal and informal communities of practice are common; these often form by faculty members' disciplines, within student affairs offices (i.e., student activities or residence life), or by the nature of the work (i.e., athletics or advising) (Smith et al., 2004).

Building on the work of Lave & Wenger, anthropologist Jan Nesper chose to explore knowledge acquisition in terms of space and time (including physical actants as well as community relations among individuals). Nesper emphasizes that communities of practice are ways of producing and organizing space and time, creating networks of power for those involved without regard to individual location of either centrality or periphery (Nesper, 1994). Essentially, Nesper centers the conversation on the fluidity of many environments that an individual can be a part of, as opposed to putting the individual at the center of a bounded network or community of practice.

Nesper's *Knowledge in Motion: Space, Time, and Curriculum in Undergraduate Physics and Management* involved the study of undergraduate students at a large public

university in the fall of 1986. The majority of this text focuses on students' encounters with their discipline of study, how education is accomplished as a space-time process, and making sense of knowledge practice in terms of interactions with others (Nespor, 1994). Primarily using social network theory and actor-network theory language, he often refers to groups or communities of practice as networks, individuals in those networks as actors or nodes, and the relationships between/among the individuals as ties. The goal of *Knowledge in Motion* is a quest to identify a way of talking about how people move into fields of practice, in addition to the exploration of the ties that bind the structure of curricular networks and the knowledge that flows through the nodes (individuals) in them (Nespor, 1994).

Another key distinction of Nespor's research with Lave and Wenger's community of practice literature is that Nespor does not view knowledge as held within the confines of a community of practice or single network. Knowledge in motion, as he describes the students' relational experience, refers to the distribution of actors in connected networks where an individual's learning occurs in many directions at once and intertwines with other people and things (Nespor, 1994). Lave and Wenger describe how individuals move into, within, and out of the boundaries of communities of practice, while maintaining the focus on the individual; in contrast, Nespor focuses on movement through the activities, ties, and practices that hold together worlds of knowledge (Nespor, 1994). By removing the focus of centrality (social network analysis) and community periphery (legitimate peripheral performance), Nespor is able to more freely explore the relationships and impact of environment on those in a given community.

Physical Space as an “Actor” in the Network

Nespor’s work also reflects the actor-network concept of symmetry in which physical and non-human objects are given equal weight to human actors when thinking about networks. Textbooks, homework assignments, curricular pathways and systems of assessment are included in his analysis of the student experience. Accordingly, though not specifically cited in the social network literature, the physical space of a learning community is a very important and influential attribute. Physical space, much like the structures such as curricular clusters, are a part of a learning community network in that they can shape the nature of relationships established among the individuals. Since residence halls are the place where learning and living intersect, they are a key element in the development and sustainment of a learning community. Mere brick and mortar alone does not provide the stimulating and community-building dynamic necessary for a flourishing community.

MacGregor and Smith acknowledge the expansive variety of learning community models but denote the most common two themes among them: (1) provide an environment for intellectual coherence, and (2) building and academic and social community for students (MacGregor & Smith, 1992). Considering that nearly seventy percent of what students learn during college results from out-of-class experience, consideration for the residential component of learning community has garnered much attention in the past decade (Kuh, 1981). “Student residences and academic buildings should be placed so that students experience the campus as an integrated community, not simply as distinct sets of buildings for separate uses” (Kuh et al., 1991, p. 308). The integration of residence halls with academic happenings on a given campus is a core

component of a successful learning community, providing opportunities to learn both in and out of the classroom.

Prominent contributor to learning community research, Charles Schroeder poses the following questions to higher education administrators, faculty, and student affairs professionals: “In our haste to provide students with highly specialized programs and services, have we failed to identify some basic needs the students attempt to satisfy through their living environments? Do we really understand the effects of architectural arrangements on student behavior?” (Blimling et. al, 1981, p. 36). These types of questions push for a discussion about the condition of the residence halls on a given campus. Consideration for features such as moveable furniture, wider hall ways, suite-style residential rooms, technological resources made readily available (computer labs, tablet and/or personal laptop accessibility, etc.), common spaces for study and recreation, and even policies to allow students to personalize their rooms more (hang posters, decorate, and enhance the existing structure and furniture) are often suggested options for the planning stages of implementing a residential learning community.

Similarly, overall balance is important regarding the physical space of learning communities. Considerable research touts the value of academic spaces constructed or defined within residence halls (classrooms, study rooms, computer labs, etc.); however, too much challenge and overstimulation of the academic piece of a learning community can cause negative student perception (Blimling et. al, 1981). For this reason, recreational and multi-purpose spaces should also facilitate social events and students should be given the freedom to gather/plan independently. The critical balance of academic and extracurricular offerings echoes the foundation of a viable learning

community and can help bring the many aspects of collegiate life into a more seamless and supported experience for students.

Among the five dimensions necessary for a successful community (Goodsell, Love, & Tokuno, 1999), shared setting is strongly emphasized for strong student buy-in. Students need a shared environment to experience this learning and development outside of the classroom setting. Learning communities are distinct from traditional residence halls, specialized and clearly identifiable (Blimling et al., 1981). For learning community students, the “domain” of their community of practice is often a shared major, interest, or goal and the pursuit of learning community membership gives even greater significance than merely a shared interest alone (which aligns with the definition of communities of practice and emphasis on relationships with purpose). “Commonality of purpose, unity, transcendent values, and cohesiveness distinguishes a community from a traditional residential unit” (Shroeder et. al, 1994, p. 167).

Careful consideration should be given to the methods of technological integration & saturation for contemporary residential learning communities. This is a timely issue given that a technology-infused environment is among the top expectations of incoming students (Pryor et. al , 2007, pg. 57). Castell’s theory of Real Virtuality explains how “individuals interact constantly in an environment interwoven with media; considering that the world is so accessible, the fast flow of information has led to increased specialization” (Castells, 2000). The relationship to this and the “dark side” of social capital literature is very apparent. The lesson to be ascertained here is that technology is an undeniably valuable resource for communities but there must be more than computer labs in the residence halls to ensure strong relational ties.

Self-Authorship and Construction of Knowledge

Since learning is an active process that is stimulated by practice, encounters with problems, and/or interactions with other people... this reinforces the importance of creating positive living environments which foster opportunities for self-authorship, meaning-making, and relationship building (Smith et. al, 2004). Particularly for the first year of the college experience, students involved in learning communities traditionally see notable success. Learning community students show a much larger growth intellectually between the freshman and sophomore year (moving from dualists to multiplists), far beyond their non-LLC peers (MacGregor, 1991). It is important to note that these advancements are not merely happening to these students; learning community students are also more likely to be actively engaging and pursuing academic opportunities at institutions of higher education. The “practice” in these communities of practice will grow over time as students develop relationships among one another and benefit from knowledge sharing.

The role of social capital in social networks is pivotal to understanding the interconnected concepts of embeddedness, structural holes, and oppressive network systems (often referred to as the “dark side” of social capital in social networks). Broadly, social capital is defined as the “sum of resources, actual or virtual, that accrue to an individual or group by virtue of possessing a durable network of more or less institutionalized relationships of mutual acquaintance and recognition” (Gargiulo and Benassi, 1999, p. 298). Due to the vast amount of research and literature on the topic of social capital, focus here is specifically on the concept of social capital as it relates to social networks. Social networks are the ties an individual has to other people; the nature

of the ties can vary and the study of the network itself can be very revealing to understanding one individual's social capital in the context of his/her network. The literature in this field indicates that people are shaped by social context, such as norms, trust, social networks, etc. (Coleman, 1988). Bourdieu defines social capital as the resources that result from social structure but Coleman focuses on social capital as a function of social structure producing advantage; meanwhile, Putnam believes social capital is a feature of social organization (i.e., trust, norms, and networks) that can improve the efficiency of society by facilitating coordinated action (Burt, 2002). Burt states that social capital is a metaphor about advantage and sees it as a social structure that can create a competitive advantage in pursuing a given end; better people enjoy higher returns, therefore a competitive advantage to structural holes in networks (Burt, 2002).

The role and influence of capital (social, human, etc.) has been studied in educational settings in many ways. One particularly relevant example is Cote & Levine's 1997 study of colleges students' motivation to forge relationships in college in an effort to increase their human capital skills. This study indicated that students with an interest in personal development and viewing the university as a vehicle for gains (financial and career) were strongly correlated with the acquisition of social competencies & capital (Cote & Levine, 1997). These students were identified as highly connected in a network of peers in addition to relational ties to faculty, staff, and other persons of influence within the educational setting.

Inspired by Sanford's Challenge & Support theory as well as the work of other great theorists, Baxter Magolda established the Learning Partnership Model (LPM, 2004;

Sanford, 1967) as a way to facilitate students' transformation from dependence on external authority to self-authorship (Kramer, 2007). The three key principles of self-authorship include 1) validating learners' capacity to know, 2) situating learning in the learners' experience, and 3) mutually constructing meaning (Kramer, 2007). The LPM requires "the challenge of external authority and simultaneously, support for the student's emerging developmental maturity"; likewise, the dependence on authority is challenged through "exposure to epistemological, intrapersonal, and interpersonal complexity" (Kramer, 2007, p. 220). This emerging development is part of the learning that happens within these learning communities. Although the literature on learning communities is largely on how to structure and facilitate them (external authority), the assumption is that the learning actually happens between and among the students (internal authority development).

An aspect of learning communities that begins to tease out this concept of how the learning takes place can be found within the concept of self-authored learning. Students are developing the ability to construct knowledge and importantly, doing so alongside their learning community peers. Providing a shared learning experience is at the very core of a learning community (Tinto, 2003). A shared learning experience is further articulated as an opportunity to engage in "...learning an active, constructive process of making sense and meaning... stimulated by practice, encounters with complex problems, and interactions with other people" (Smith et al., 2004, p. 223). Research on the social, intellectual, and ethical development of students in college reinforce the importance of creating positive environments which foster more complex and self-authored levels of meaning-making (Smith et al., 2004). This meaning-making occurs at a rate unique to

the individual but sharing in the learning process with peers makes the learning community dynamic supportive at both an individual and group level.

CONCLUDING THOUGHTS

“Well-designed learning communities provide a structure that can be adapted throughout the years... they can become the glue for a fragmented college experience. Ultimately, the most important reason for incorporating learning communities into a college or university’s curriculum is to provide a place where students can practice collaborative learning, problem definition, problem solving, leadership development, reflection, and self-assessment.” – Smith et al., 2004, p. 344.

From the residential colleges of Oxford and Cambridge, to the early dorms of the American Ivy League institutions, and the experimental residential models at the University of Wisconsin and Berkeley, the concept of serving the whole student is the common thread. The history of learning communities provided opportunities to refine the structure of such collegiate offerings and the evolution of time served to emphasize the core values of student development, learning, and the value of personal relationships. With many theories and models as inspiration, contemporary learning communities are as diverse as the students who bring them to life. Whether in the 1900’s or in 201, two key themes remain among living learning communities: the value of learning and fostering relationships.

Residence halls provide a venue for student development, learning, and success. The works of the many aforementioned theorists give framework to what happens in the residential environment and can help facilitate the learning process. Additionally, these

theories and related models serve practitioners well in the establishment of learning outcomes that keep student development as the focus. For learning to occur both in and out of the classroom, residence halls are a key partner to success. The student affairs staff in these departments and programs are charged with the task of applying the theoretical framework to practice in an effort to provide students with meaningful experiences. The sense of belonging that results from students in positive residential communities is a proven tie to academic achievement, contempo, and success. Higher education as a whole benefits from a strategic and positive residence hall partnership.

Learning communities are an attempt to resolve multiple issues in undergraduate education including but not limited to: disconnection among general education courses, student isolation, lack of meaning between general education and discipline-specific courses, need for more student-faculty interaction, need for greater development opportunities for faculty and staff (Macgregor and Smith, 1992). These communities provide an opportunity for an institution of higher education to provide an environment to foster student relationships and support the multiple dimensions of development. College living environments are related to personal development outcomes and considerable research has been done in this area (Chickering, 1974; Astin, 1977; Feldman & Newcomb, 1969).

While a student may note that the physical features of a college are among the most important factors in creating a first impression of the college (Thelin & Yankovich, 1987), it is the relationships that sustain past the superficial impressions of a campus infrastructure. Sense of belonging and establishing relationships are paramount to the student experience and particularly critical to learning outcomes tied to residence halls.

This connectedness is an influencing factor in whether a student succeeds and develops in college and a sense of mattering is a necessary prerequisite for students to become involved in campus activities and/or academic pursuits (Schlossberg, 1989). For this reason, learning communities are a contemporary community of practice where many facets of the higher education experience intersect. In order to provide an environment rich in relationships and experiences to aid development, higher education learning outcomes must be carefully created, clearly articulated, and scrupulously implemented.

Ultimately, by examining learning communities as communities of practice, we are able to explore additional dimensions of these groups of students. Meaning can be made of the relationships among students and with other learning community program stakeholders in addition to consideration of the environment that these networks are nestled in (both physical and psycho-social environments). The language offered by community of practice, in conjunction with social capital and social network analysis works, provides a new and contemporary lens to review learning communities and their value. With social capital as an emerging branch of study within learning community literature, a firm understanding of this subject is required (Cote & Levine 1997; Castells 2000). Considering more contemporary framework, such as examining interactions among learning community students via social network analysis, necessitates an understanding for both classic learning community theories and literature as well as a firm understanding of key concepts related to social capital and social networks.

CHAPTER 3: RESEARCH DESIGN

Residential learning communities are ideal for examining student relationships and self-reflection of one's experience within a community of peers. In recent years, social network analysis has caught the attention of higher education professionals as an innovative and scholarly method of data analysis and data presentation (Campbell, Campbell, DeBlois, & Oblinger, 2007; Siemens & Long, 2011; Thomas, S.L. 2000; Skahill, 2002; Borgatti, Stephen P. et al., 2009). A litany of great work has already been completed that demonstrates the positive impact of learning communities on student success in higher education; however, the depth and variety of the methods employed provides opportunities for new studies to enhance the existing literature. With the rise in popularity of social networking sites such as facebook, Instagram, and twitter, an increased curiosity about the impact of individuals and interactions with others in online or in-person communities has caught the attention of higher education as well.

The topics of learning communities and network analysis come perfectly into focus together when one asks the question "How can we learn more about the interactions among students and those peer relationships which contribute the greatest to student success in college?". The answer is the very focus of this work: to study a sample of individuals interacting in community with one another in an effort to identify the unique roles of the individuals and understand the relationships that develop between them.

Given the extensive history of co-curricular peer to peer learning environments (dating back to historical residential colleges), a tradition and robust array of research intended to assess whether these environments work, and a literature that provides theoretical explanations for why they should work... the clear emerging issue is the lack

of understanding of what happens inside the communities. This study fills that gap by seeking to explore of how students in community learning from one another through their relational ties and exchange of capital (knowledge). Both the way that knowledge is self-authored by students and the influence of role within the community warrant consideration in regard to student success as defined by the community. That “community” can be as the specific network of peers/stakeholders being examined and values held important therein; however, the “community” can be defined as higher education broadly with traditional authority measures of success such as GPA and persistence. We know that some students are more successful than others in navigating the first year of college; network analysis gives us a visual representation of those community members and quantifies the roles, relationships, and attributes that contribute the greatest to success.

Social network analysis, as we know the methodology today, emerged from scholarly works in a multitude of disciplines including social sciences, mathematics, medicine, and economics (Martino & Spoto, 2006). Early studies on graph theory and sociometrics (Moreno, 1934) led to a boom of research at Harvard University in the 1940’s. Harvard researchers W. Lloyd Warner and Eltan Mayo expanded the discipline with research that explored employee relationships and working conditions in New England. Their studies were among the first in-depth explorations of peer communities (not-parental group) (Warner, Lunt, 1941). In the late 1950’s the concept of role began to take a central part in Social Network Analysis (Nadel, 1957). John Barnes was the first to introduce the term “social network” (1954). Significant advancements in network analysis are due, in large part, to researchers from Manchester University Department of

Social Anthropology (Prell, 2011). Those studies of relationships, flows of information, and social capital helped to frame the contemporary body of work in this discipline (Scott, 1992).

Network analysis as a contemporary method of analysis and measurement has origins in the 1970's with Bourdieu's work in social capital and related theory (1972, 1977). Social network analysis, as an examination of relationships between individuals and placement within a specified community, allows researchers to explore the connections and implications of relationships between people. This methodology creates a visualization of a network map which allows the types and intricacies of ties to be more fully examined most commonly through the lens of communities of practice

The objective of this study is to better understand the importance of role and relationships in a network, specifically for undergraduate students in a residential learning community, by using network analysis to assess the patterns of academic and social ties. Network analysis and statistical measures serve as the quantitative methods chosen for my study. In addition, the survey instrument was specifically designed with open-ended responses to provide additional student reflection and perspective to the network map of relationships and roles. The qualitative component of my mixed-methods approach tells a richer story rather than only nodes and ties on a map. The human perspective, feelings, and self-reflections add qualitative richness to the study as a whole, providing balance to the objective construction of a network with the subjective perspective of peer relationship formation.

SITE SELECTION

It was important that my study take place at an institution that simulated the most widely applied learning community model; therefore, the following was my rationale for the selection of my study population. Learning communities exist at all types of higher education institutions; however, the most popular are large 4-year public colleges or universities, with the common goal of create smaller community opportunities for students within the larger school setting. With more than 50 possible schools in this category, I narrowed to approximately 20 probable schools due to the length of time their learning community programs had been in place (7-12 years) and being located in non-urban areas of the southern portion of the country. Brand new learning communities are not most ideal for this study as they are not established enough in terms of resources and stakeholders; meanwhile, long-time learning community programs are so established and robust that they are already the subject of many contributions to the literature. For schools with learning communities of an age of 7-12 years, I had reasonable access to 11 of these schools due to geographic proximity. Among these schools, 3 stood out as best meeting the criteria specified. To respect the sensitive timeline required of this study and to ensure adequate progress through required processes such as Institutional Review Board approval, the school as the focus of my study was Southern State Public University* (*pseudonyms utilized for the institution name as well as subsequent departments and programs for the purpose of this study).

The setting for my study was a 4-year, public institution in the southern portion of the United States that is moderately selective, non-urban, with a reasonably well-established learning community program. Southern State Public University has 16

academic colleges for undergraduates to choose from and an enrollment of approximately 20,000 undergraduate students. The target population in the study was classified as traditional (ages 18-19), first-year college students who were members of a residential learning community. Specifically, the Engineering Learning Community was established in in the early 1990's as a partnership between the Division of Student Affairs and the College of Engineering in an effort to provide an opportunity to build community among Engineering undergraduate students. This community was among the first learning communities established at Southern State Public University and is therefore one of the most established and stable on campus, which made it a reasonable selection for the focus of this study.

The learning community was application-based, meaning that it was open to students with majors or pre-majors within the College of Engineering but did have a limited number of membership opportunities (residential rooms) available. Diversity of majors, gender, ethnicity, and interest in community membership were considered by the Student Affairs selection committees who determine learning community makeup. Though some may argue that the application for a learning community makes these groups exclusive, I would argue that they exhibit no greater homophily (the tendency for people to want to be around others that they have something in common with) than other students groups on a given campus. Learning communities are built upon the very idea that those who have a common goal, interest, or other attribute are more likely to succeed than those who are more isolate or otherwise disconnected during the college experience.

The residence hall (Hamilton Hall) that housed this learning community had wings of the building specifically designated for the community and the rooms therein

were randomly assigned roommate scenarios (unless students specifically requested a fellow learning community member as roommate on the housing application). The residential rooms were suite-style in that one residential room houses two students and this room shares a bathroom facility (toilet, shower, sink) with the adjacent room. There were three floors divided symmetrically by gender devoted to this learning community. Hamilton Hall was overwhelmingly populated by the learning community (approximately 60%); however, there are non-learning community students (largely traditional first-year students) that comprise of the other approximately 40% of the total building population.

Examining the Engineering Learning Community was well-suited for my analysis for four primary reasons. First, this data exhibits the quality that I wanted to study in that this was a community of first-year college students engaged in a learning community. Their interactions, relationship development, and personal reflections provided an incredible set of data to examine in an effort to understand relational and role identify as it related to student success. A learning community was a wonderful sample to utilize for my survey because it constituted a diverse group of students who shared a common interest and similar goals, and this echoed the broad applicability of this model as it served as a microcosm of the contemporary college student experience. Secondly, due to my prior professional experience as a Student Affairs professional at Southern State Public University, this population was easily accessible for my study. The University was eager to learn more about the interactions among learning community students and the factors that help them become more successful in college. This, in addition to my personal interest in the broader learning community literature, made the Engineering Learning Community an ideal population for this particular study.

The innovative use of network analysis as a means to quantify the impact of roles and relationships within such a community of residential students was the third reason for my study. This was a very unique approach to a well-established body of literature, which added depth and breadth to the ways in which we can better contribute to student success, acclimation, and satisfaction with the college experience. I suspect most practitioners and administrators alike can agree that this is a desirable goal for any campus. Network analysis is a fresh and contemporary method approach that is a relevant and logical approach to enhancing what we know about learning communities.

Network analysis also provided a unique opportunity to explore not just actors and relations within a given network, but also permitted the exploration of information flows and knowledge generation (both self-authorship and knowledge transfer among nodes, the fourth reason this community pairs so well with network analysis). The relational ties between nodes in a network allow for a flow of information (knowledge, social capital, etc.). Additionally, the mixed-method approach to my survey provided not only the valuable objective quantitative data to produce the visual representation of the network map... but also very importantly, it created an opportunity for the student voice to be heard through carefully selected open responses that incorporate personal perspective, reflection, and the subjective identity formation feedback that revealed a story beyond just relational ties and nodes on a map. Triangulation of thematic analysis from qualitative data with quantitative measures provided enhanced analysis and further validation. The design of this survey provided sufficient information for the objectives and it provided valuable insights and an opportunity to enhance the existing literature in these conceptual areas.

DATA COLLECTION

A mixed-method, web-based social-network survey (via Survey Monkey) was utilized to gather the data for this study. The concepts of social capital, student development, connectedness, and community structure are addressed through both quantitative and qualitative methods. The survey was made available to all members of the community. Student participation in the survey was purely voluntary; with no repercussions or penalties for not participating. Students were given a unique ID number that permitted them to log into the online survey. A spreadsheet with student identifiers was maintained, but the actual names of the students for data analyses and presentation were concealed. All responses were held in the utmost confidence.

The survey followed a typical roster-guided network survey format, with additional specific questions related to satisfaction, academic achievement, and relationships within the community. Best practice for network analysis surveys utilizes a name list in the left margin with questions relative to each individual on the right side of the survey layout (Marsden, 1990; Bernard, Killworth, Kronenfeld & Sailer, 1985; Burt, 1981). For a survey in this format, a student sees the list of peers along the left margin of the screen and the same question is asked of each student alongside the name listed. This format repeats for every question included in the survey. Typically, a grid structure is utilized to visually designate the roster and the questions to provide ease as the respondent navigates through each question or prompt.

My sample design utilized nonprobability sampling and target sampling, as I specifically wanted to learn more about the pattern of ties and roles within this particular Engineering Learning Community. Nonprobability sampling does not involve random

sampling and this is generally the case with network studies that have defined groups, members, or parameters that clearly identify who is involved. The objective my study was not wide generalizability, although a positive outcome is that the conceptual model of this method can be applied to other populations of interest. Since similar learning community research has been done at other institutions, but no research conducted yet for this particular community, this study is classified as exploratory research.

The desired response rate for this survey was at least 75%. This indicates that approximately 70 out of the 93 learning community students needed to respond to the survey in order to obtain the desired response rate. However, a full response of the community members (100%) is incredibly rare although most ideal to most accurately discuss the nature of the network although such a complete and full response. In order to produce a network map that provides network members with accurate pictures of bridging and bonding, a survey response rate of at least 75% is typically required (Borgatti, Carley, & Krackhardt, 2006; Wasserman & Faust, 1994; Kossinets, 2006). Although some network analysis best practice does reveal that a response rate of approximately 50% may yield sufficient data to reveal primary structural features of the network, a greater percentage allows for fuller and more complete network analysis. Response is essential for network studies so as many actors (nodes) as possible can be included to help establish a more complete network analysis.

The survey was distributed in the Spring semester of 2014 (academic year Fall 2013-Spring 2014). A complete copy of the survey instrument and all student communications (student letter, survey memo, invitation email, and reminder email) have been included in the Appendices.

To help ensure adequate response, participants were notified of the study months in advance via a community meeting with the in-hall staff. I met with hall staff to provide a brief overview, purpose, and answer any questions posed. Hall staff (resident advisors) then shared this information at each of their individual hall meetings. Additionally, students were invited to participate via email and through individual residential mailbox memo (same verbiage used in email and memo). Given that the primary method of communication between the learning community students and the program leaders (i.e. Resident Advisors, Program Coordinator, Resident Director) is via email, this was a familiar channel of communication and many were likely familiar with web-based surveys as well. Students are generally quite technologically savvy, most are very comfortable using computers (many are likely familiar with web-based surveys, especially now that teaching evaluations are completed online at the end of each semester at Southern State Public University), and the majority of students bring their own personal computers to campus (permitting them to complete the survey in the security of their own room and on their own computer, which may foster a greater willingness for honesty). The email message included a brief overview of the study, indicated the date that the survey would be available to complete, and provided a link to the web address to complete the survey. An email reminder was sent four times over the course of the survey window, as typically a reminder can be helpful in boosting response rates.

There is much strength to this method of measurement. With web-based surveys, convenience is a hallmark since students are able to respond when it is convenient in their schedules. This provides the opportunity for the survey to be completed when the respondent feels comfortable and when it is convenient for them (various computer labs

around campus, computer access in Hamilton Hall, personal computers in many student rooms, etc.). Open-response questions were designed within this particular web-based survey to provide ample space to respond (many characters) within a single text box in the web-based formats. Whereas pencil-and-paper formats leave a certain amount of blank space for responses which could drive the response to feel obligated to fill the space, the online text box disguises this by design (encouraging the respondent to write as much as he/she feels is appropriate).

It was presumed that all survey responses are valuable in terms of this study since this an exploratory research study and subjective perspectives/reflections are part of the data gathered. There was no minimum number or specific question that had to be answered to consider a survey “acceptable”. The higher the response rate, the better social network analysis can be conducted (because more of the nodes in the network would have data). Even incomplete surveys provided valuable information as not all network measures require reciprocated data. I utilized data from students who took the survey to create a respondent network (works better to learn about centrality in the network) alongside a full network (includes non-respondents) as appropriate to the given statistical measure being applied.

To be fair, there were weaknesses to this study that merit explanation. Some participants may have felt uncomfortable sharing information about relationships with other learning community students via a web survey (i.e. no administrator present to answer questions at that moment, social desirability, or may not fully understand the purpose of network analysis). Sometimes, network studies can feel too personal, as some individuals are not comfortable sharing their thoughts on one relationship versus another

and knowing others will be responding about them. Clear explanation of purpose of the study was addressed in early conversations with participants and again explicitly outlined in participant memo to help students feel more at-ease if they elected to voluntarily participate in the study. A web-based survey indicates some degree of confidence that prospective respondents are both familiar and comfortable using the computer to complete the survey. Given that students are so inundated with emails, they may delete the email and not take the survey; there is always a risk of the email being caught in a spam filter. The mailbox memo and in-hall meeting reminders were helpful tools to navigate any email desensitivity. There was no rapport than can be built through this method; interviewing, for example, gives an opportunity to help the participant feel more comfortable and willing to share (respondents do not receive that type of interaction with the computer). Therefore, intentional time informing hall staff about the research and survey method was critical in helping students feel very comfortable with voluntary participation in this study.

Due to the fact that this is an exploratory study, I vetted the survey with other experts for additional feedback prior to distribution. Experts include: Student Affairs Officers at benchmark institutions who advise Living Learning Programs, esteemed professors who are significantly involved with residential learning communities or social network analysis with nationally and internationally recognized publications on the topics, and my dissertation committee. Feedback from these individuals provided additional insight regarding theoretical framework, additional literature for guidance, as well as refining the instrument to help result in a richer set of data.

I have also constructed a more detailed content validity check with the relevant literature both within and supplemental to my literature review. This provided me with a more robust look at the completed surveys in this general topic area and helped to ensure that the established response rate was still appropriate, review any additional findings in the area of social network analysis, and highlight any other potential questions to be added. Additionally, I distributed a pilot survey for this study in 2009 to further refine my research interest and methods of analysis. This pilot study was vetted with a nationally recognized leader in network analysis, carefully developed for the desired statistical measures (descriptive, thematic, & linear regression models), and follows best practice protocol for survey as well and network analysis research.

With regard the organization of data management, I completed multiple measures to facilitate reliability and validity. When the survey went live via Survey Monkey, I took careful measures to ensure the data was handled properly. I articulated a specific timeline that the survey would be available via Survey Monkey and carefully monitored progress via the website. This allowed me to monitor the response rate and send out reminder(s) via email in an effort to encourage learning community students to complete the survey.

Once the specified timeframe was up, I transferred the data from Survey Monkey into a private folder on my personal computer. This is the electronic folder where my dissertation research is stored. This information is also backed-up on an additional hard-drive linked to my personal computer, all with private user login and password protection that is exclusive to only me. All electronic folders require my private username and password to gain access to these documents. The Survey Monkey data was saved as an

excel document in this folder. There was both an excel document with information just as pulled from Survey Monkey as well as an additional excel document with the coded data.

METHODS

Given that learning communities are highly defined and structured programs, targeted sampling is an ideal match especially with network analysis since the desired outcome is data from as many individuals from the specified community as possible (to give best network representation). It is important to note that this targeted sample is not convenience sampling, rather it is a systematic and purposeful method by which both the network and the individual can be examined in meaningful ways. This non-probability sampling does limit specific findings to the population being studied; however, quantitative findings alongside the contextual and descriptive information provided by the qualitative components can offer generalizability and innovative methodologies to such programs at large.

A total of 102 individuals were invited to participate in this study. The Engineering Residential College (ERC) is the larger of the two Engineering Learning Communities housed within Hamilton Hall. The ERC includes a total of 74 students, 19 female and 55 male. The other piece to the Engineering Learning Community in Hamilton Hall is a hybrid program for business and engineering majors (Management And Engineering or MAE). MAE includes a total of 19 students, 6 female and 13 male. Academic major information is provided below:

Table 1: Academic Majors within the Engineering Community

| Major | Number of students |
|-----------------------------------|--------------------|
| Biosystems Engineering | 3 |
| Chemical Engineering | 23 |
| Civil Engineering | 6 |
| Computer Engineering | 8 |
| Computer Science Engineering | 12 |
| Electrical Engineering | 5 |
| Materials Engineering | 2 |
| Mechanical Engineering | 20 |
| Mining Engineering | 12 |
| Biology A&S | 2 |
| Management B&E | 1 |
| Marketing B&E | 2 |
| Undeclared | 1 |
| Blank/no data provided | 2 |
| Professional staff (major is n/a) | 3 |

The in-hall staff was included in the study also. Three full-time professional staff consists of one male Resident Director, one male Resident Engineer, and one female Office Assistant. Additionally, 6 Resident Advisors are also part of the in-hall staff and participated in the study (4 males and 2 females). Survey was opened on 2/20/2014 (notification and link sent via email) and was closed fourteen days later on 3/5/2014. Email reminders were sent to students to encourage voluntary participation on February 23rd, 25th, and 28th as well as a final reminder on 3/4/ 2014.

Response rate for this particular study exceeded the 75% standard best practice for network surveys (Borgatti, Carley, & Krackhardt, 2006; Wasserman & Faust, 1994; Kossinets, 2006). Out of 102 individuals in the community (all were invited to participate), 87 completed the survey for a response rate of 85.29%. When the nine staff

members (all completed the survey) are removed from the community, 78 out of 93 students (25 female, 68 male) completed the study for an 83.87% response rate. This strong response provides great network representation and opportunity to examine both network-level (community) and node-level (individual) analyses.

Social network analysis (SNA) is the ideal methodology for this study as it utilizes data collection techniques, statistical (qualitative and quantitative) analysis, as well as an opportunity to visualize via matrix algebra or otherwise represent the data in mapping networks. The visual representation typically is displayed via graphs, regression analyses (datasets and relationships), and/or matrix format. Once survey output data were cleaned, matrices were uploaded to SPSS (ISBM, 2012) and UCINET (Borgatti et al., 2002) and quantitative analyses were performed to identify measures of nodes and ties.

Although social network perspective focuses attention primarily on the ties between nodes more than simply attributes of the nodes, both the relationship and attribute data are important data structures for quality network analysis. The most common type of data structure for network analysis is the actor-by-actor matrix. This structure is two-dimensional and square (in that it has equal number of rows and columns) but quite significant in that it provides information about the relation between a pair of nodes such as friendship (Hanneman & Riddle, 2005). This two-dimensional structure is easily expanded into a richer third-dimension by adding detail, or degree, to the types of relations (i.e. close friends, adversaries, etc.). The other most popular data structure is called an attribute data set, or a conventional statistical variables or vectors (i.e. age, gender, betweenness centrality measure for each node, etc.). Data

transformation in network analysis is most effectively processed within UCINET but may also undergo additional manipulation in other statistical software tools such as SPSS (IBM, 2012; Borgatti et al., 2002).

In addition to relational analysis, gender is also used as an analytic variable in this study. While an abundance of research specifically on the importance and influence of gender in studies of Engineering students has been conducted and could lend additional context here, it is not necessary to understand this research nor employed as central focus in methodology nor analyses (Daudt & Salgado, 2005; Kusku, Ozbilgin, & Ozalke, 2007; Galloway, 2007; Skaggs, 2010; Mayberry, 1998). For the purposes of this research, gender is not the central focus but an attribute to better parse and deconstruct the larger network structure. Rather than an examination through a gender-focused lens, this study maintains a community of practice focus to facilitate both broad network analyses and individual/relation measures. Two key concepts for SNA are relationships (ties among nodes) and centrality. The Knowing Networks are the initial visual representations of node ties in this study. Additionally, centrality measures and additional regressions are also included in Chapter 4.

The statistical software packages utilized for this study were specifically designed to facilitate and aid in network analysis. UCINET is a data analysis program designed for social network analysis in that it conducts measures of structure, content, and results of relationships between and among actors within a given network (Borgatti, Everett, & Freeman, 2002). Survey data about the student peer relationships was entered into the program, which computes network measures (such as closeness centrality) that were used as variables in analysis. NetDraw, the visualization companion to UCINET, was also

used to visually examine the academic and social networks created within the community. This software was incredibly valuable in creating a visual from the social network analysis data. Additionally, IBM SPSS Statistics 21 was utilized for descriptive statistics and regression work (IBM, 2012).

Through careful instrument design, execution, and analysis, this study provided a model that can be applied to other populations beyond learning communities. Network analysis as the research method for this study was particularly important and uniquely positioned this contribution to the existing learning community literature because it provided both a visual and a mathematical analysis of complex relational interactions. By examining residential learning communities as communities of practice through network analysis, the influence and information of relationships and knowledge (both development and transfer) could be ascertained. A common objective for any community of practice-based program is to encourage information flow, knowledge sharing, and learning (Wenger et al., 2003). The ability to study such communities in this way provides the opportunity to improve learning community programs and promote increased student success. Given that the unit of analysis was both the community and the individual, the community of practice lens is ideal to capture the data from both perspectives.

ANALYSIS OF DATA

Due to the fact that this study was exploratory research, my data analyses were focused primarily on network measures with additional work in descriptive statistics, thematic analysis, and work with regression models. In addition to data obtained from

this survey, I also utilized student demographic and relevant academic information available through the learning community report comprised of student self-reported data (gender, major, room number, and learning community). To check my variables, I ran univariate statistics before doing comparative analyses to help ensure clean data. Additionally, ties in the network were not symmetrized unless necessary for statistical measures. In most cases, it was important for this data to reflect the direction of relationship (i.e. one person may think of another as a friend but that feeling may not be reciprocated by the other and it was often valuable to see the directional flow of such ties). Additional procedures with this data included work with regression, visualization, network structure analysis, and triangulation with qualitative and quantitative findings.

Relationship data entered in UCINET produced network measures (closeness centrality) and this information was utilized in regression analysis. This produced information about the density of the network (academic and social relationships) and was used in multiple regression analysis to show single node position in the network related to other variables (GPA, centrality, etc.). A regression was processed between centrality and answers to questions about the community. Student self-reported GPA served as the dependent variable and the learning community question responses as dependent variable. The resulting measures and analyses provided correlation between variables such as friendship, relational ties with staff member, and advice-giving alongside reported GPA. This data was also visualized through node size and centrality measures to generate maps of the output.

Relational data was visualized in a variety of network maps to better display node position and connectivity within the network. The Knowing Networks were

visualizations of the relational data displayed “who-knows-who” within the network (shows a map of nodes & ties) and directional arrows were used. The Friendship (popularity) Networks displayed friendship ties from a dichotomized matrix. This map was very helpful in obtaining a quick snapshot of the network. Similarly, strength of tie was visualized to demonstrate relational variation within the network structure. Line thickness was used to visually represent the strength of ties in the friendship network. The width of the ties indicates a closer relationship (“close friend” is the thickest tie). This can create a bit of a mess visually and as mentioned, doesn’t provide an exact distance measure. Breaking down maps by strength and extrapolating based on variables such as community and/or gender revealed the most connected nodes clearly. As the strength limit was increased, fewer ties remained. Looking at tie strength had implications for density and network cohesion.

Best practice in network analysis surveys is to include a few general questions first, before the roster-based portion begins, and to locate any open responses questions at the end of the survey. These standard protocols were followed for this study. The nature of the open-ended questions in this survey included academic, social, and personal perspective. These open responses provided opportunity for students to elaborate further regarding influential people in the network, perspectives on success, and personal reflection on academic achievement. See below for the sequence of open responses included in this survey:

1. Do you feel that being a part of the Engineering Community has contributed to your academic success at Southern State Public University? Please explain.
2. Are there any Engineering Community students in particular who helped you succeed academically? Please provide name(s) and explain.
3. Please indicate your cumulative GPA, which includes Fall 2013:

4. Did you ever attend Social Hour on Wednesdays in Hamilton Hall? Please describe your experience & impressions of this event.
5. Did you ever attend Monday Night Tutoring in the Hamilton Hall Classroom? Please describe your experience & impressions of this event.
6. Did you attend the Seminar Series/classes "Modern Challenges of Engineering" hosted by the Engineer-in-Residence? Please describe your experience & impressions of this event.
7. Is there any additional feedback you would like to share about your experience with the Engineering Community?

Raw (unedited) answers to the open response questions were recorded in the excel

document. This qualitative data was reviewed and thematic reduction was utilized to document emergent topics. Among the options for qualitative analysis of short answers to open response prompts, specifically those involving self and network reflection, word repetition is among the most commonly used method for theme identification (Ryan & Bernard, 2003). "Perhaps the simplest and most direct indication of schematic organization in naturalistic discourse is the repetition of associative linkages" (D'Andrade, 1995, p. 294). I added an additional column in my "coded" document to record emergent themes for each response. Academic themes found in this study are consistent with those often cited in learning community literature: study groups, classes, homework, exams, review, notes, GPA, projects. This thematic analysis was triangulated with quantitative measures for further validation and data analysis.

CHAPTER 4: RESEARCH FINDINGS & INTERPRETATION

Using community of practice as a lens, this chapter reviews the findings of the survey to uncover information about the interactions between/among students that create a pattern of ties and the relationship to success. Given that the research question driving my study is, “How does one’s role within a residential community of peers relate to success in college?”, this necessitates an examination of both the community and the individual as units of analysis. For the purpose of this study, “success” has been operationalized in two ways: 1.) defined academically as examination of grade point average (student self-reported), and 2.) defined socially by the number of and strength of relational ties within the network.

A network is a system of nodes (also referred to as actors, individuals, or points) that are interconnected by a variety of ties. These nodes are representations of individuals in the network being examined; in this case nodes are the people within the learning community. Ties are the represent the binary or dyadic relationship between nodes. Network variables can be utilized in dyad, node, and network level analyses. All three level variables provide insight into network structure and aid in the examination of node position. Position within the network is incredibly import, both who a given node is connected to (the ego node and his/her respective alters) and where you are within the structure of the network as a whole via centrality measures. Network analysis foundation consists primarily of cohesion and connectedness.

Network variables are explanatory when items such as achievement, benefit, or performance are studied, as is the case with social capital and/or education-related studies such as this one. This flow of social capital and related relational information is dyadic

data that can be measured in both full and ego networks. Measuring network variables as outcomes allow the researcher to examine at each level of analysis (i.e. Dyad: Who is friends with whom? Node: Who is most popular? Network: Why are some networks very centralized while another may be more asymmetrical?).

The examination of the network map as well as ego network compositions, permits greater depth in the examination of one's role in a network and connections to outcomes such as self-reported academic achievement and personal satisfaction measures (connectedness, strength of ties, variety of relational ties). This approach reveals greater information about relationship dynamics and influence as well as capital acquisition and transfer, an ideal match of community of practice theory and network analysis methodologies. In the sections below, findings from the survey are shared in standard statistical measures (descriptive statistics), thematic analysis from student open-responses, regression model analysis, and a selection of network analysis maps to visually display the relational measures and multiple attributes of the community.

Both qualitative and quantitative methods have been used in this study. Qualitative research findings aid in revealing details about interactions, perspectives, and feelings that are well suited to for descriptives and developing context. Qualitative results were analyzed through thematic reduction for triangulation purposes and this ensures a mixed-methods approach. Additionally, since qualitative methods have limited evaluative utility, quantitative research is utilized to more thoroughly examine the network structure and dynamics through application of network and statistical measures. The application of both qualitative and quantitative methods is an effective way to increase the validity of research and employ triangulation for validity checks.

KNOWING NETWORKS

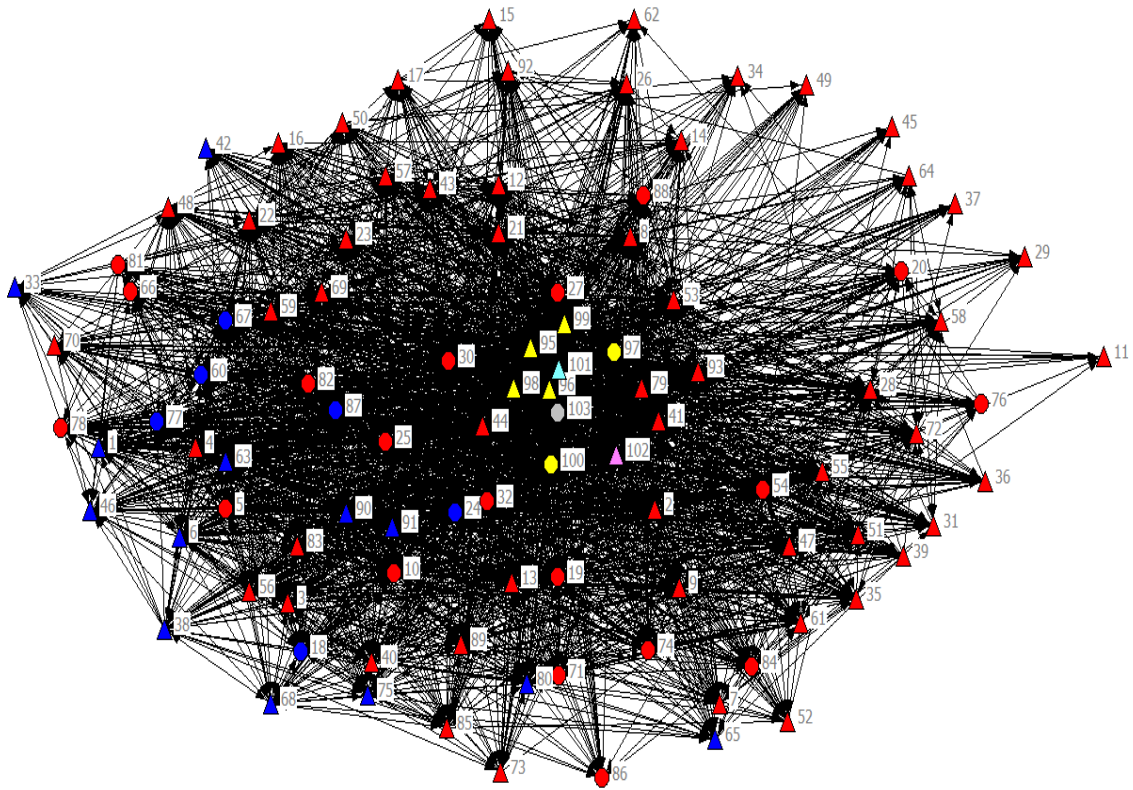
The Knowing Matrix displays the natures of the ties between the nodes. Survey respondents were prompted with “Which best characterizes your relationship with this person?” and were able to select one of the following options below (numbers added later for coding & analysis):

- 1 = An Adversary
- 1 = We haven’t really met
- 2 = An Acquaintance
- 3 = A Friend
- 4 = A Close Friend

This valued data is transformed into binary data by the UCINET dichotomize tool. This feature allows the ordinal friendship data to be represented simply as either the presence or absence of a tie. This is particularly useful given that many tools within social network analysis (SNA) were developed specifically for binary data (i.e. the classic network matrix populated with only 1’s or 0’s). All ties with codes of 1 or blank (no response) were transformed to zero values. This zero value represents the absence of a friendship tie. All ties with codes of -1, 2, 3 or 4 were transformed to a value of 1 to represent the presence of a relational tie. Adversarial relationships were included in the friendship dichotomized data as it is representative of a degree of familiarity with another.

Figure 1 below is the Knowing Network for this community, this and other figures are included in the appendix in larger format:

Figure 1: Knowing Network visualization



Visualization legend:

- Gender values: 0 = male (imaged by a triangle); 1 = female (imaged by a circle)
- Community values: 1 = MAE (imaged by blue); 0 = ERC (imaged by red)
- Hall staff values: yellow = Resident Advisor; turquoise = Resident Director; grey = Office Assistant; pink = Resident Engineer

Peripheral nodes are those who didn't participate in the survey (look at directional

arrows for confirmation), some peripheral nodes may just be more isolate individuals. In the case of this particular network, the more peripheral nodes are largely represented by students who did not participate in the study (their lack of reported ties pushes them to the edges of the network). For the purposes of this analysis, the Knowing Network map is a quick visual representation of basic familiarity within the network.

Also important to note here is the nature of the relational ties. Directed relations are represented by ties with arrows ($A \rightarrow B$). The direction is meaningful and could be

one-directional or both ways. This is most commonly correlated to asymmetric data (do not want to force symmetry as it would alter the directional relations). The Knowing Network has directed ties in order to display a node's outgoing relationship (or who they reported a relationship with). Undirected relations are represented by lines between nodes without arrows (A – B). This relation may be as simple as being in the same room with another individual but not interacting. Undirected relations are most commonly correlated to symmetric data as symmetrizing such matrices helps create a more complete data structure.

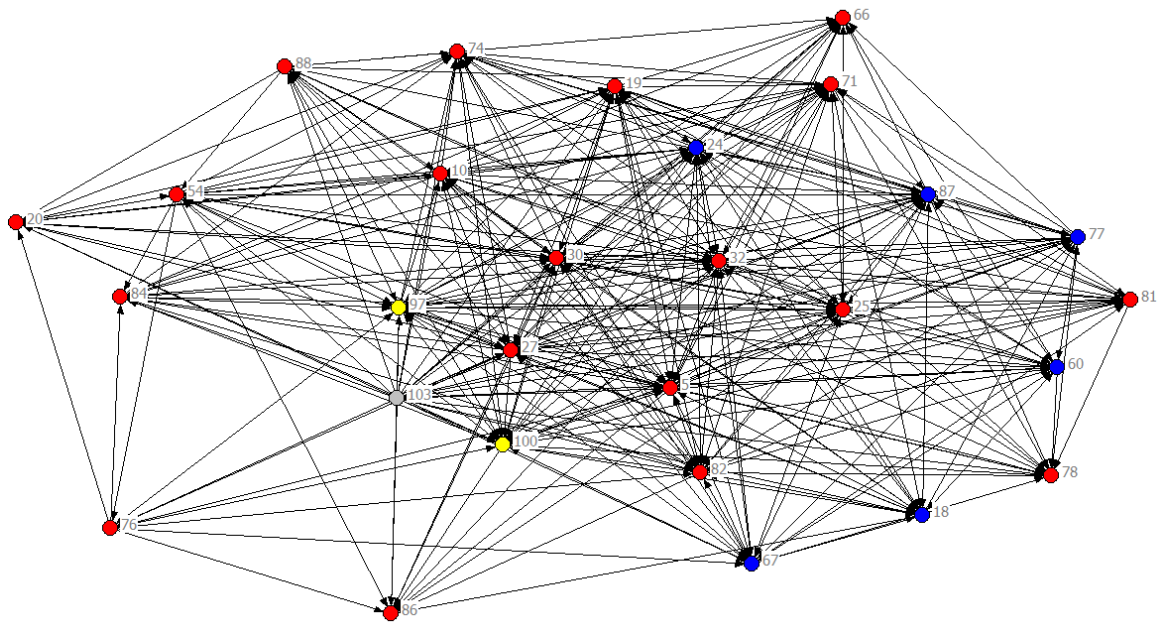
Common learning community goals focus on developing relationships among participating students. Familiarity ties are the most common example of primary relational data in network analysis. For many early-stage learning communities, the simple goal of helping students develop relationships with others in the community is a basic goal that has strong ties to retention and academic success (Tinto & Goodsell, 1994; Terenzini et al., 1996; Magolda, 2004; Tinto, 1998). While this dataset does show reciprocity through the use of directional ties (i.e. Jill reports knowing Tim, but Tim does not report knowing Jill), it does not show strength of tie (i.e. Jill reports Tim as her best friend, Tim reports Jill as an adversary). Tie strength is examined later in this chapter.

FEMALE KNOWING NETWORK

By extracting only female members of the community, the map of female familiarity relations with other females in the community can be better displayed. Among those most highly connected females in the network include: 30, 32, 25, 5, 82, 24, 87 and both female RAs as well as the female office assistant. This female

connectedness is confirmed through the survey open responses in that female students were more likely to reference other female students as people in the community who were most influential to their academic success.

Figure 2: Females-only Knowing Network

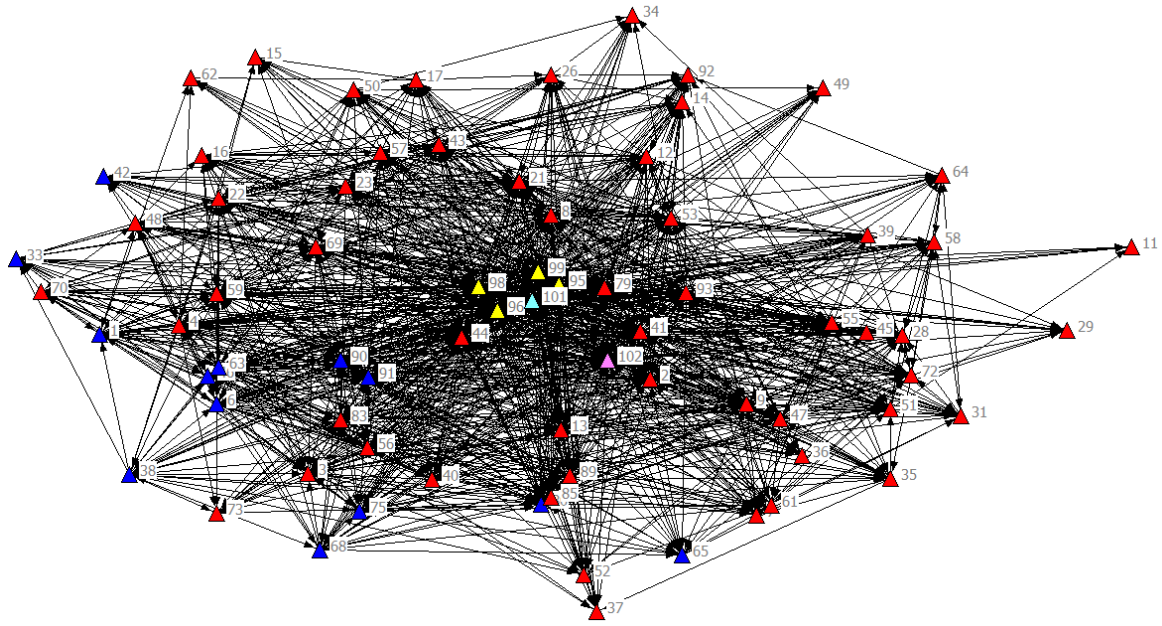


MALE KNOWING NETWORK

Male community members are also highly connected to the hall staff, as is the case with the female network. Among the males most connected include nodes 79, 44, 41, 2, 13, 8, 21, 89, 93, and 9. Also consistent between the male and female networks is the observation that the MAE students are more peripheral than ERC students. This is not terribly surprising as by sheer size, the ERC is the significantly larger community. Unlike the Female Knowing Network, male students cited both same and opposite gender students in the open response regarding individuals who positively influenced their academic success. It stands to reason that since the female population is notable smaller,

they are more likely to be known by the male students in the community (in that they are easier to identify within the larger group context).

Figure 3: Males-only Knowing Network



Much like dichotomous data as reflected in the Knowing Networks, another important trait of data structures for broad computation is symmetric data and its applications. Many measures of network properties, as computed by UCINET, are built to handle symmetric data only (Hanneman & Riddle, 2005). Not all datasets should be symmetrized, as this is purely dictated by the attribute or relationship being examined. For example: in a matrix of friendship it may not be useful to symmetrize if you want to know that Johnny reports being friends with Suzy; however, Suzy indicates that Johnny is an adversary. Though there is a bidirectional tie between these nodes, the nature of the relationship is not truly symmetric. In this case, it would be best to leave this matrix asymmetrical to maintain the integrity of the data as collected by the participants. However, sometimes symmetrized data is very useful in that it can make an otherwise

incomplete matrix into a more complete dataset or to assess strength of tie (relation strength analysis).

The Knowing Networks reveal that this learning community is a highly familiar and integrated group of students. Even with survey non respondents included in these visualizations, the network is a remarkably well-connected group of individuals who have only known each other for the duration of a single semester. Given that development of peer relationship, smooth transition, and overall satisfaction are among the most primary goals of a learning community, this program is achieving these goals very well. Interestingly, this was also a primary goal of the earliest learning communities of Oxbridge. Building a space and experience for students to forge relationships and more readily access support has been a measure to manage enrollment growth as well as enhance the collegiate experience since the early 1900s (Adelman, 1969).

Further supporting these findings are the results from some of the open-ended questions in this survey. Not only do over 94% of survey respondents indicate that they understand the purpose of the learning community, but over 93% report that they enjoyed the community experience and that it contributed positively to their overall experience at Southern State Public University. Additionally, over 97% of survey respondents indicated that they are friends with students in the community. When asked for any additional feedback they would like share at the conclusion of the survey, references to friendship, smooth transition into college, and sense of support or community were among the most popular responses provided. Samples of student responses regarding getting to know and interacting in the community included below:

- “It helps to have other people in the same classes so that you all can learn the material together and study when tests come around. If you don't know how to do something, or need any help, you have an excellent support network. Everyone's incredibly friendly and willing to help you in any way they possibly can- no matter how well they know you.” - A female student, MAE community member, node 24
- “I know many people seem much happier being surrounded by the people in this dorm. Many times, friends from other dorms have visited and have said that this is a much more friendly atmosphere (in Hamilton Hall) than anywhere they have experienced on campus.” – Male student, ERC community member, node 12
- “Learning communities should be something that every campus should use. I would not have made as many friends and connections in engineering without this program. I love it!” – Female student, MAE community member, node 87

Even with preliminary network analysis at relational familiarity, this in addition to the qualitative findings from the study indicate that this community is in fact a well-connected group of peers who are pleased with their learning community experience. At any institution of higher education, this basic assessment would be welcomed and appropriate validation of basic community goals being met.

STRENGTH OF TIE NETWORKS

Beyond basic familiarity relationships among learning community peers, strength of tie measures between nodes gets at the concept of network density. In this case, the researcher can choose an approach that symmetrizes data based on attributes such as

average, maximum, or minimum strength tie between nodes. The best practice for symmetrizing data is to take this action based on the average relation. As an example: if Pam denotes Holly is a friend (valued at 4), but Holly indicates Pam as an acquaintance (valued at 2); the symmetrized data will reflect the relationship between holly and Pam as a 3 value. If the researcher chooses to symmetrize based on minimum relation, it makes the network appear more sparse based on reciprocated ties represented and can skew analysis negatively.

To examine strength of tie for a network, ranked data must be obtained from respondents. In the case of this research, ranked relational data was incorporated into the survey to facilitate the standard interval relation ranking with one alteration. Since adversarial relations are more developed than the absence of relationship, all ties are ranked differently for strength of tie measure versus the aforementioned dichotomized Knowing Network. For strength of tie measurement, the ranks are as follows: Close Friend = 5, Friend = 4, Adversary = 3, Acquaintance = 2, We haven't really met = 1. This data is symmetrized based on average relationship type and then applied as relation attributes to the basic Knowing Network within UCINET then visualized to produce the Strength of Tie map as provided.

Figure 4: Knowing Network with Strength of Tie Network

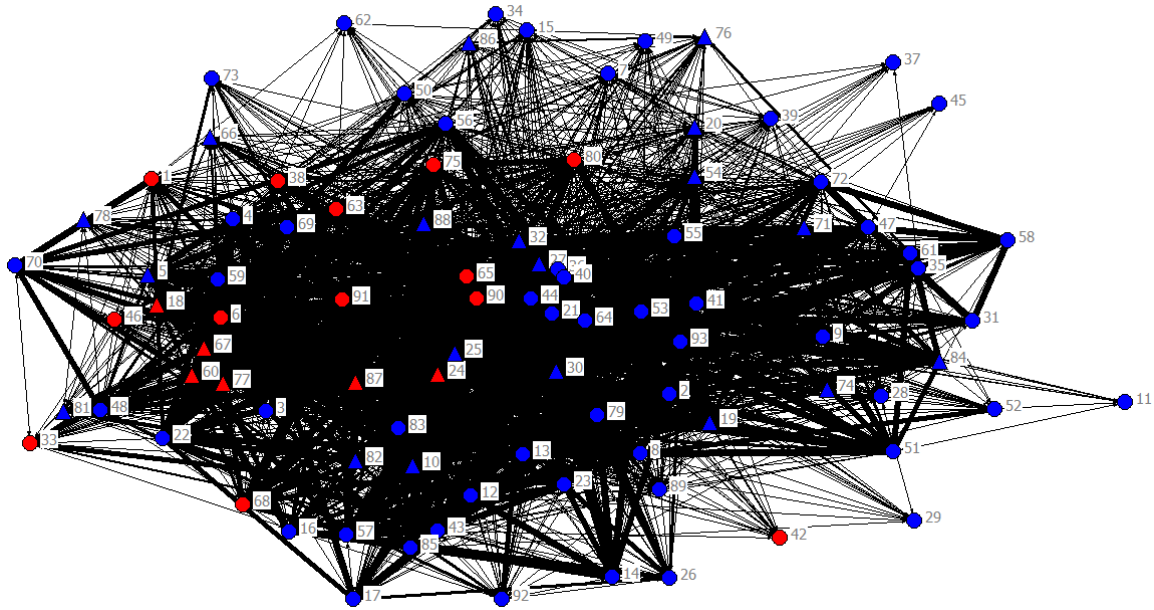
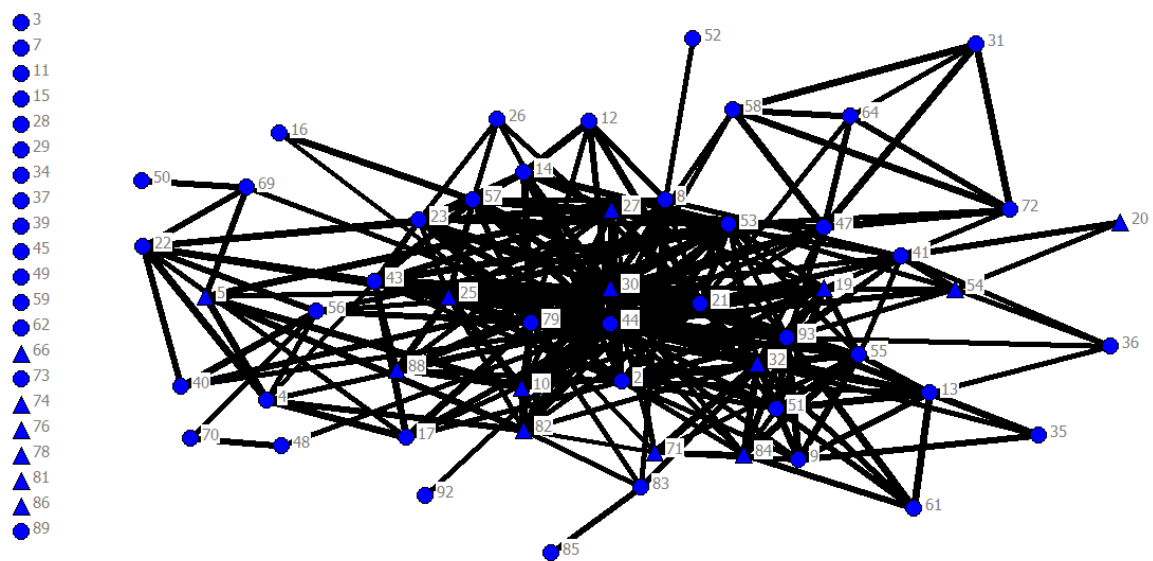


Figure 4 uses thickness to visualize relational type. The thickest lines represent the most highly developed relationships (close friend) while the thinnest line represents the least developed relationship (haven't met). For visual purposes, staff members were omitted from this visual to better display student-student relationships. Important to note with this map is that males are represented by circles, females by triangles, ERC in blue, and MAE in red. The strength of tie representation is particularly helpful to review not only network structure, but to obtain a better understanding of the nature of ties especially among the most highly connected nodes. Since this network was already confirmed as highly familiar and connected, it does create a dense visualization of ties that can be difficult to clearly identify. In this case, four male nodes (27, 30, 25, & 87) as well as nine female nodes (23, 21, 14, 43, 57, 79, 44, 2, & 53) represent the most highly connected nodes but also possess the greatest strength ties (highest frequency of "close friend" relations).

Specific enumeration of ties among nodes will be provided later in this chapter through centrality measures, as this provides greater precision. Connectedness can be confirmed through centrality measures as provided later in this chapter (example: nodes 79, 44, and 87 are among the most prevalent brokers in the network). Early speculation may suggest that because there are fewer females in the community, they are more easily identified (and perhaps more likely to develop close relationships among themselves) within the network at large.

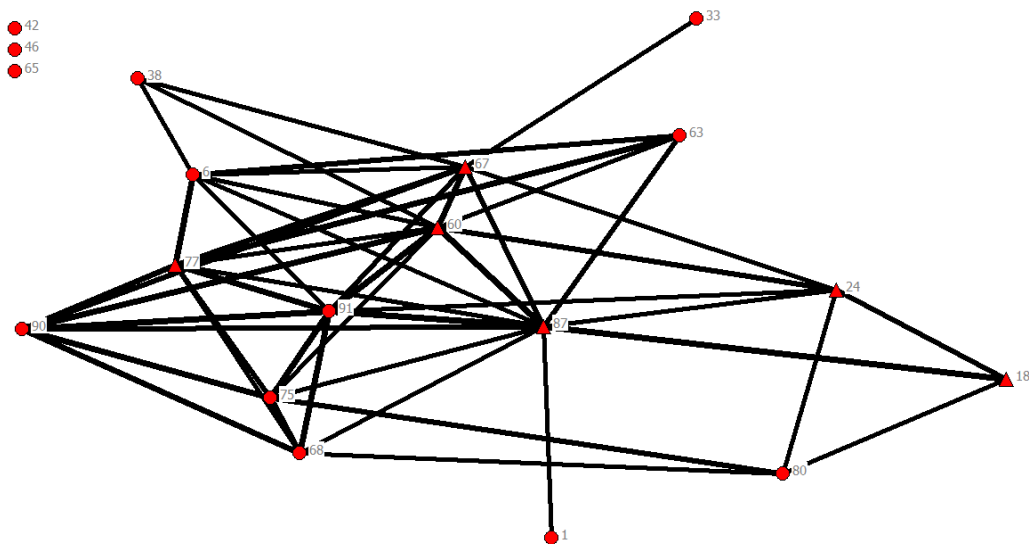
Since strength of tie maps can be difficult to discern at a network visual level, isolating particular communities and clusters for closer examine proves useful. Since there are technically two communities (ERC & MAE) within this larger network, displaying the strength of tie relationships by community is useful to identify density in each. In Figures 5 & 6 below, strength of tie has been limited to only display “friend” (4) and “close friend” (5) to simplify the visualization. Males are represented by a circle node, females by a triangle node.

Figure 5: ERC-Only Friends & Close Friends



This visualization confirms network density even at this level of more significant relationship (“friend” and “close friend”). Specifically important from this map, it is easy to identify nodes that are in critical positions of connectivity between the central core group and more peripheral friends (i.e. nodes 13, 54, 22, 56, among others). These nodes play an important role for capital flow as they are in the path of multiple relational ties and broker different groups. Additional information specific to brokerage roles will be discussed later in this chapter.

Figure 6: MAE-Only Friends & Close Friends

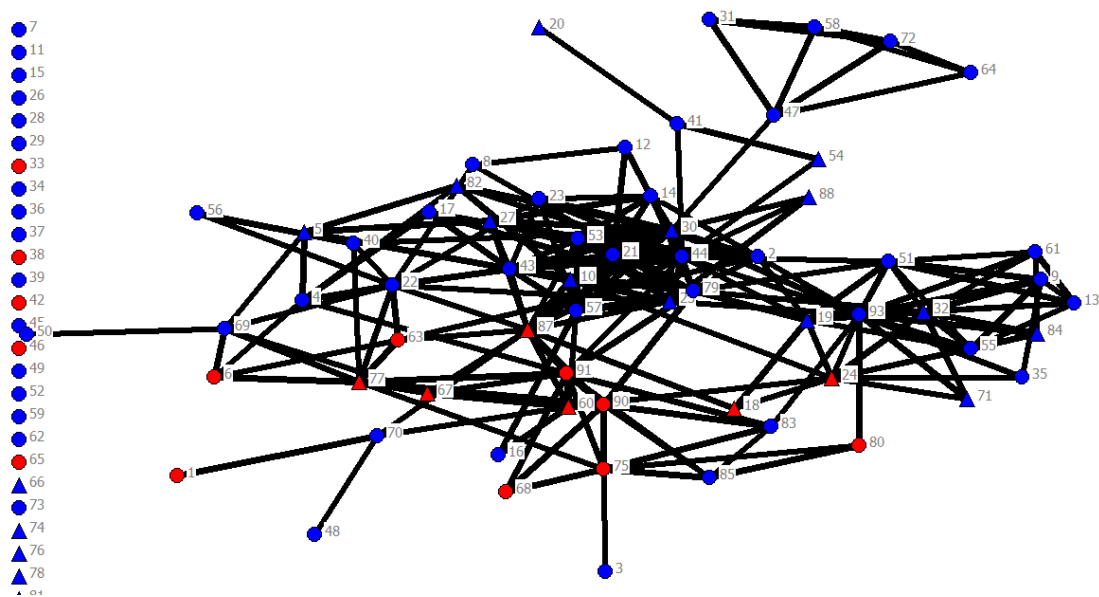


Although a smaller sub-community, MAE students are still a highly connected group of individuals within the larger Engineering Learning Community. These students share a special connection as this group includes students of non-Engineering majors (the business major component to this community structure). Since these students share courses exclusive to their academic discipline, they are exposed to another community of practice (College of Business) and the relations and physical agents within. This is consistent with Nespor’s research on academic discipline communities and the influence

of those specific experiences (1994). Certainly, this visualization confirms that MAE students are embedded within the larger community structure with significant relational ties with ERC students but are also a close-knit group within themselves.

A map of only the “close friend” (5) relationship is provided below. This map allows closer examination of nodes most highly connected in the network.

Figure 7: Close Friend Strength Network (ERC & MAE)



One of the most interesting observations from this analysis is the position of node 47 (male in ERC). This student is strongly positioned as a broker in the network as he is the gateway for four others to the larger network. This is commonly referred to as a pendant in the literature and is not an uncommon phenomenon in networks. Regarding social capital, a node like 47 is very valuable to the four exterior nodes (64, 72, 58, & 31) but can also be highly disruptive to the network structure and capital flow if node 47's relationship tie ever severs with node 30.

The Strength of Tie networks reveal that not only do members of the learning community know one another, but overwhelmingly the students report significant

friendships with others in the community. These findings affirm the timeless structure set forth by the earliest American residential communities, as a primary objective was the development of a close community of students in an intellectually stimulating atmosphere whether in the twentieth or twenty-first century (Ryan, 1992; Duke 1997). Thematic analysis of the open response data provides additional affirmation of student feelings of positivity, support, and friendship that already emerged through these relational structures. Not only did over 97% of students report that they made friends in the community, but the strength of tie data reveals the complexity of these friendships. A male MAE student in the community (node 6) specifically indicated “Since most of the people you live with are going through the same courses it makes it easy to form study groups and develop close friendships with your peers.” Another male student (ERC member, node 8) echoed a similar sentiment, “This community is so good for making friends in the same major and to share knowledge with others.” Students in the learning community are well connected and close friends with one another, male and female as well as MAE and ERC.

NETWORK CENTRALITY

In addition to general relational measures (i.e. who do you know and connectedness), centrality is the other key concept for SNA. Centrality is defined in SNA as how a person is positioned in a network structure based on ties with other nodes (or actors). For the purpose of this study, the primary centrality measure utilized is the Freeman Degree Centrality. This measure is the enumeration of ties between students in the learning community. Students with the largest number of relationships within the community have the highest degree centrality values. Degrees of centrality for the

Knowing Network is a range of 8 to 77 total relational ties reported. This indicates the most highly tied or central person has a count of 77 of 101 possible relationships within the community. Measures of centrality were calculated for the full network and highest values indicate highest centrality.

Centrality indicates how important a node (based on position) is within a network. Centrality is an attribute of a node's position and is a way to identify a node's structural location and/or power within a network. There are four key aspects of centrality: degree (number of ties), closeness (number of links to others such as one node separation), betweenness (one person is the link between two main clusters), eigenvector (a node has a high eigenvector score if connected to nodes that are also very well connected). Closeness or centrality is actually a construct, although network literature does reference these items as a measure.

Table 2: Excerpt from Network Centrality Data Output

| Centrality Measures | | | | | | | |
|---------------------|----|--------|-----------|---------|--------|-----------|---------|
| | | 1 | 2 | 3 | 4 | 5 | 6 |
| | | Degree | BonPwr | 2Step | ARD | Eigenvect | Between |
| | | ----- | ----- | ----- | ----- | ----- | ----- |
| 1 | 1 | 46.000 | 9565.294 | 101.000 | 73.500 | 0.085 | 10.275 |
| 2 | 2 | 70.000 | 14075.615 | 101.000 | 85.500 | 0.125 | 31.293 |
| 3 | 3 | 56.000 | 11724.931 | 101.000 | 78.500 | 0.104 | 15.547 |
| 4 | 4 | 59.000 | 11977.094 | 101.000 | 80.000 | 0.107 | 23.791 |
| 5 | 5 | 58.000 | 12231.771 | 101.000 | 79.500 | 0.109 | 16.305 |
| 6 | 6 | 57.000 | 11758.070 | 101.000 | 79.000 | 0.105 | 15.852 |
| 7 | 7 | 33.000 | 7211.046 | 101.000 | 67.000 | 0.064 | 3.898 |
| 8 | 8 | 65.000 | 12822.141 | 101.000 | 83.000 | 0.114 | 37.211 |
| 9 | 9 | 55.000 | 11709.744 | 101.000 | 78.000 | 0.104 | 11.353 |
| 10 | 10 | 60.000 | 12764.519 | 101.000 | 80.500 | 0.114 | 16.093 |

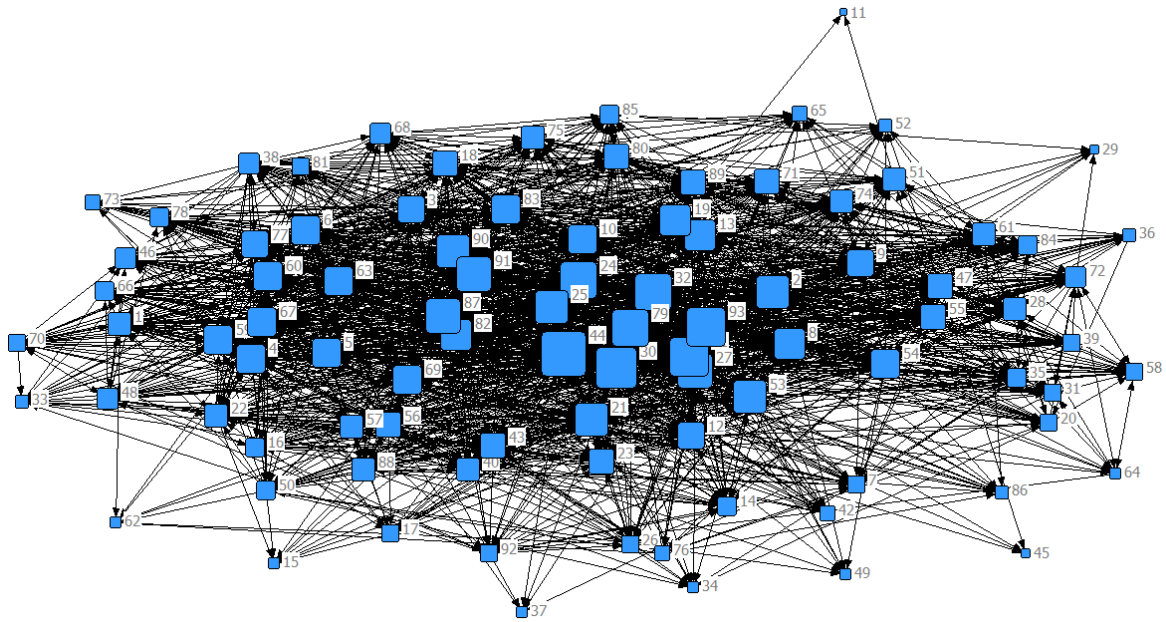
By running centrality measures on the symmetrized Knowing Network dichotomized matrix, we are able to more clearly identify node position in the network. In order to run centrality, the matrix must be symmetrized. For the purpose of this study,

symmetry was applied based on average relationship data to balance any range of responses provided.

Assessment of this measure will exclude hall staff as it has already been repeatedly demonstrated that the hall staff are highly centralized due to the nature of their role in the community. Additional discussion of centrality here will focus on student nodes in the network. Freeman Degree Centrality range is 8 to 95, indicating that there are no students with zero ties to other nodes in the network. Additionally, the most highly integrated node has a reported count of 95 ties to others in the network.

Bonacich's Eigenvector Centrality is similar to Freeman's Centrality as interval measures of centrality; however, eigenvector centrality is distinct in that it measures the relationships through which each node is connected (Borgatti, Carley, & Krackhardt, 2006). This calculation within UCINET employs a measurement of centrality for each node based on the degree centrality measure of all their ties (Royal, Akers, Lybarger, & Zakrajsek, 2014). Nodes with high eigenvector centrality are friends or tied with others who are also tied to many others. Students in this network with high eigenvector centrality (range is 0.019 to 0.152) are tied to other students who are also highly connected (Bonacich 1991). The visual representation below displays the nodes in the full network with node size reflective of eigenvector centrality degree, that is nodes with the greatest eigenvector centrality (most central) are the largest nodes.

Figure 8: Friendship Network with Centrality



Clearly emerging as highly central, and further verified by earlier map analysis without centrality measures, are nodes 44, 30, 41, 79, 93, 24, 32, 87, 91 (these are valued highest eigenvector degree in data output range of 0.152 - 0.0.134). Of these top ten highly central nodes (all ERC except for 1 MAE student) and there are six males and four females represented.

It is important to discuss the algorithm utilized for the visualization map here. Multiple-dimensional scaling (MDS) is utilized on symmetric data within UCINET and provides two types of proximities among/between nodes (similarities and dissimilarities). Dissimilarities look at distance (example: 1 = my best friend, 17 = a person I know the least). Similarities examine correlations or strengths of ties (example: 10 people went to 8 events together, versus 2 people who attended 1 event together). MDS provides both numeric and graphic output of data. The graphic output is a visualization of the nodes, ties, and attributes as selected. The numeric output indicates

how distorted the visualization is by a value of “final stress” (close this value is to zero, the more accurate the visualization of the data). The nonmetric MDS coordinates feature in UCINET allows the researcher to make the network less sensitive to outliers (less push and pull of the network shape if an outlier node is loosely tied).

For visualization of MDS data, a Graphic Layout Algorithm (GLA or Kamada Kawai) is utilized. GLA takes a matrix of 1's and 0's and creates a distance matrix as well as the creation of an MDS from those distances. For symmetric data, if there is no distance yet identified, a cohesion calculation for distance may be run in UCINET to create a distance matrix. This matrix most typically represents the closest path to one person is between a certain number (x) of people. The higher this number (x), the less friendship; lower this number (x), the closer the nodes or the stronger the friendship between nodes. This measure runs an algorithm that keeps from displaying two nodes on top of one another (very helpful for visualization). Geodesic distance assists with the measurement of strength of ties. By running the Kamada Kawai GLA, the distances are averaged (equalized) to one another but the spring embedder helps the visualization display more clearly. It is important to note that GLA images, while more visually appealing and serve a distinct purpose for visualization, do not have the same meaning as MDS images because the distances are made more equal than the actual distance measures.

The Centrality Networks peel back yet another layer of this learning community. The centrality measures confirm that not only have these students developed friendships (most of them close friendship) but the network structure also reveals an appropriate balance of network positioning. This network positioning is evidenced by nodes with

multiple ties (i.e. people report many friendships within the network) and there are emergent individuals who are among the most highly connected. Creating a space that promotes social life and collaborative experience was among the earliest learning community objectives dating back to Oxbridge and Dewey's progressive school models (Adelman, 1969; Smith et al., 2004) and the aforementioned centrality measure is an affirmation of this community meeting that goal.

Given that connectivity and friendship (specifically within the residence hall setting) is so closely correlated with involvement (Astin, 1984), the centrality networks triangulate well with the strong value of friendship and the high degree of involvement reported by the students. Over 83% of survey respondents reported involvement in community events whether academic or social in nature. Approximately 67% of respondents reported attending the community's Wednesday Social Hour on a regular basis and cited the event as being a great social activity with great food, interesting topics, and a good opportunity to meet people from the college (faculty/staff). Additionally, approximately 49% of respondents reported attending Hamilton Hall Monday Night Tutoring (hosted in the in-hall classroom) regularly and cited that this was a good designated opportunity to work on homework and study for tests. Others who did not report regular attendance cited schedule conflicts or prefer to study in smaller peer groups or visit the campus tutoring center. These results are consistent with learning community literature and further validates the success of this community. The other key goal of a learning community is academic success. This element is examined in further detail in the section below.

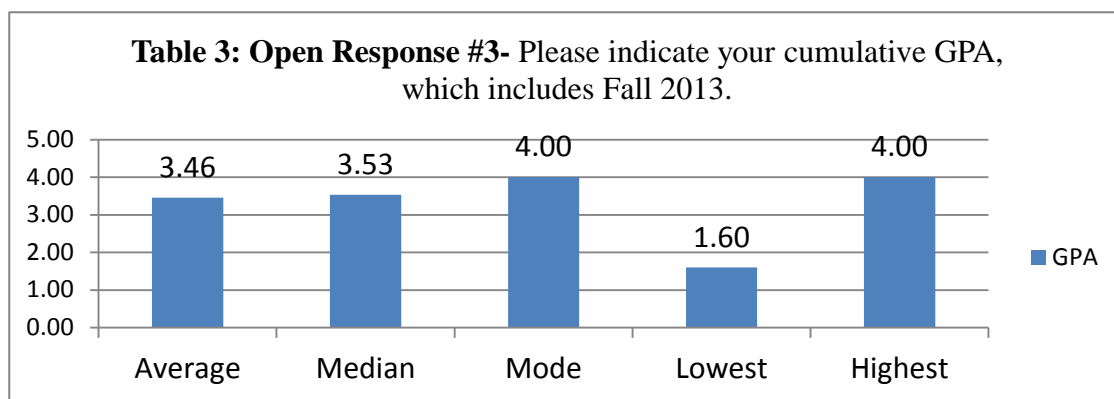
REGRESSION ANALYSIS & GPA

In order to examine the relationship between two variables, linear regression is utilized. Given the independent variable value, predictions can be made for the value of the dependent variable. Three basic hypotheses emerge from the variables in this dataset:

- Is popularity (the amount of people who list you as a friend, or adversary) related to GPA?
- Is the amount of connections you have with staff members related to GPA?
- Is the amount of advice-giving related to GPA?

As an overview of the GPA data self-reported by nodes in this network, Table 3 has been provided:

Table 3: Self-Reported GPA Data for Fall 2013



Since Fall 2013 campus-wide data was not yet available at the time of completion of this manuscript, Fall 2012 is referenced here. Southern State Public University reported an average first-year student GPA for Fall 2012 of 2.99. The average GPA for Fall 2013 was 3.37 for first-year *learning community students* across Southern State Public University. The Engineering Community average Fall 2013 GPA of 3.46 exceeded that of the rest of the learning community population by 0.09 and the overall university first-year student average GPA the prior year by 0.47. These findings confirm the long

standing belief that learning community students earn higher GPAs than their non-learning community peers.

An individual's popularity is best measured with In-degree centrality. In-degree represents how many times an individual was reported or cited by others (i.e. how many times others in the network list you as a friend). Out-degree represents the number of actors that a node reports as his/her friend. Non-respondents will be included in these measures since we are using In-degree, not Out-degree. In other words, it does not matter what an individual reports about him/herself; what is most important is the data reported about an individual. Therefore, the lack of survey response is a non-issue for these analyses. Additionally, Out-degree is more a measure of status (how I see myself) whereas In-degree is a more accurate measure of nature of relational network data (how others perceive me within the context of this defined group).

POPULARITY & GPA

The first measure here is to transform the friendship matrix into a dichotomized table of friendship ("A friend" and "A close friend" attributes, versus all other attributes and blanks). To obtain In-degree a measure, a network centrality is run on this dichotomized friendship matrix. This output provides a count of the number of times an individual was reported as a friend. This output can be used in linear regression alongside GPA data.

For the Friendship Network, the In-degree ranged 0 → 55 while Out-degree ranged 0 → 72 (smallest to largest count of ties). Of the 19 people in the community with zero reported friendships with others, 14 of these individuals were survey non-

respondents. The 14 survey non-respondents had an average of 9.4 people report friendships with them. Based on this friendship data, a lack of survey response is not an indicator of connectedness within the network. Additionally, the five people reported zero friendships with others (but did complete the survey) reported an average of 6.6 people report being friends with them.

The hypothesis here is: Does being popular (or having friendship ties) predict higher GPA? To test this and controlling for gender and community, In-degree for friendship is regressed with GPA as dependent variable. Gender is controlled in the popularity and friendship measures as interactions within networks may be a function of external socially constructed gender identities (Ely, 1994, 1995). The regression output indicates that popularity (friendship) is not a statistically significant predictor of higher GPA (significance = .162). Statistically significant values would be under .05, as .1 is only marginally significant.

Table 4: Popularity & GPA Regression output

Coefficients^a

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|--------------|-----------------------------|------------|---------------------------|--------|------|
| | B | Std. Error | Beta | | |
| 1 (Constant) | 3.978 | .414 | | 9.602 | .000 |
| GenderF | -.237 | .135 | -.204 | -1.750 | .085 |
| Community F | .048 | .029 | .189 | 1.629 | .108 |
| FIn | -.002 | .006 | -.030 | -.260 | .796 |

a. Dependent Variable: GPA

This linear regression model provides an interesting measure of friendship within the community (popularity) and academic achievement (GPA). The reverse of this regression measure was also run to test adversary role and GPA, this was also not statistically significant (i.e. being more highly noted by peers as an adversary is not a predictor of higher GPA). Anecdotally, this finding matches the notion that some highly visible (highly tied with friendship relations) students are more social versus academic. An example is the case of a student who is highly involved in hall programming and is widely known (and liked) by others in the community, but spends more time involved in social and extra-curricular activities rather than academic ones, perhaps contributing to a lesser GPA. Certainly these students exist in nearly every learning community. However, the other issue at play in this scenario is that the literature informs us that

learning community students have higher GPAs on average than their non-learning community peers (MacGregor & Smith, 1992; Edwards & McKelfresh, 2002; Matthews et al., 1997). With this in mind, it is worth noting that while popularity within the learning community may not predict higher GPA, students who are in the learning community (however popular or not) are still achieving at a higher rate academically than their non-community peers.

To further examine popularity and GPA, a simple sample of highly connected and centralized nodes may be reviewed. Pulling from the Knowing Network and basic centrality of all actors in the network, a sample of nine consistent nodes emerge (not including staff members). A list of these nodes and relevant information has been provided in Table 5

Table 5: Central Nodes in Knowing Network

| <u>ID</u> | <u>Gender</u> | <u>Community</u> | <u>GPA</u> |
|------------------|----------------------|-------------------------|-------------------|
| 21 | Male | ERC | 3.100 |
| 24 | Female | SEAM | 2.500 |
| 27 | Female | ERC | 4.000 |
| 30 | Female | ERC | 4.000 |
| 32 | Female | ERC | 4.000 |
| 44 | Male | ERC | 3.000 |
| 79 | Male | ERC | 4.000 |
| 87 | Female | SEAM | 3.750 |
| 93 | Male | ERC | 1.600 |

From this table, it is apparent that the GPA range is quite wide (4.000 – 1.600) and confirms that popularity is not a predictor of higher GPA. Certainly a majority of these popular students boast a perfect 4.0 GPA; however, the presence of others at the lower

end of the range indicates that not all who are highly social are also highly academic (at least not in the first semester of his/her college experience). Given this, additional regressions of other analytic variables with GPA will be examined to identify possible correlations.

TIES WITH STAFF & GPA

In order to examine the how relationships with staff could impact GPA, ego network composition must first be established. This is processed in UCINET as categorical alter attributes (utilizing dichotomized friendship matrix and identifying staff attribute via binary values). The important notation for this measure is that reciprocal ties are the only ones utilized (since this best represents the nature of a relationship with the staff, both parties report being friends). The option does exist within UCINET to run ego network composition based on the presence of one tie and only using outgoing or incoming ties. For our purposes, those options are too limiting and not reflective of the relationship being examine (friendship). Sample of output below:

Table 6: Staff-tie EgoNet Composition Excerpt

| Ego Net Composition | | | | | | | | |
|---------------------|---|-------|--------|-------|-------|-------|--------|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | Staff | f0 | f1 | p0 | p1 | Hetero | IQV |
| 1 | 1 | 0.000 | 2.000 | 0.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| 2 | 2 | 0.000 | 20.000 | 2.000 | 0.909 | 0.091 | 0.165 | 0.331 |
| 3 | 3 | 0.000 | 1.000 | 0.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| 4 | 4 | 0.000 | 13.000 | 2.000 | 0.867 | 0.133 | 0.231 | 0.462 |
| 5 | 5 | 0.000 | 8.000 | 1.000 | 0.889 | 0.111 | 0.198 | 0.395 |
| 6 | 6 | 0.000 | 12.000 | 1.000 | 0.923 | 0.077 | 0.142 | 0.284 |

From this output, column 1 identifies whether or not the node is staff (staff = 1, all others = 0). Column 2 (f0) represents frequency of friendships with other students. Column 2

(f1) represents frequency of friendships with staff. Column 4 (P0) represents the percentage of a node's friends that are students, while column 5 (P1) represents the percentage of a node's friends that are staff.

Once the ego network composition for staff relationships is complete, this data can be run in a linear regression with GPA as dependent variable. Just as was done with friendship network (popularity) and GPA with (gender and community controlled for), SPSS displays the statistical significance of relationships with staff and GPA.

Table 7: Relationships with Staff & GPA Regression

| Coefficients ^a | | | | | |
|---------------------------|------------|-----------------------------|------------|---------------------------|--------|
| Model | | Unstandardized Coefficients | | Standardized Coefficients | |
| | | B | Std. Error | Beta | |
| 1 | (Constant) | 4.070 | .402 | | 10.128 |
| | GenderF | -.249 | .134 | -.215 | -1.859 |
| | CommunityF | .041 | .030 | .162 | 1.388 |
| | f1 | -.039 | .034 | -.133 | -1.139 |

a. Dependent Variable: GPA

Based on this output, the degree to which a student has friendships with staff does not predict a higher GPA. The hypothesis stood to reason, especially for highly centralized students tied to highly centralized staff, that some correlation may exist between mobilizing one's social capital by way of staff relationship and academic advantage. However, that is not the case at least for this dataset. Staff relationships, while advantageous for the exchange and acquisition of social capital and helpful in terms of one's brokerage role in the network, do not have a statistical significance with higher GPAs. It is worth noting, however, that the Engineering Community student's average Fall 2013 GPA of 3.46 still exceeded that of South State Public University's average learning community (first-year) student as well as the general first-year student

population GPAs. This indicates that the Engineering community students are very academically successful relative to both the campus learning community student population and the university first-year student population at large. Regardless of staff relationships and/or network position, this group appears to be already predisposed to academic achievement. This point is further reinforced by the self-selection in pursuit of learning community membership and the argument that academically-motivated students are more likely to pursue membership to a learning community.

Relative to GPA as an analytic variable is the influence of academic discipline on the network as a whole. Since all of these students are majors or pre-majors within the College of Engineering, it is important to acknowledge that engineering creates its own strong community of practice from norms and cultural expectations of the academic discipline. Much like Nespor's work with Physics, these Engineering students are influenced by the practice of being within their academic college and the influences therein (Nespor, 1994). This scholarly CoP is established through relationships with key stakeholders such as Engineering faculty, staff, and upperclassmen as well as physical agents such as shared classes, facilities, and curriculum. While this CoP was not studied explicitly in this research, as was the case for Nespor's research, it is important to note here that it does contribute a degree of influence on the nodes and network at large.

ADVICE-GIVING, GENDER, & GPA

In SNA, advice in networks serves to display hierarchy. Advice is commonly used as a measure of influence in network analysis and is frequently used in network research regarding power (Brass & Burkhardt, 1993; Kilduff & Krackhardt, 1994).

Advice data is also important from a reciprocity perspective in that it is most valuable to see if the people you report giving advice to, if those people also report that they come to you for advice (can serve as an affirmation of sorts). Advice data is never symmetrized in order to preserve the important reciprocity element. Since gender has implications on advice seeking, gender will be the input attribute utilized in the egonet composition measure (Klein et. al, 2004; Ibarra, 1997, Hunt et. al, 2011, Ashton, 1993).

Out-degree for advice represents how an individual draws on others for resources or social capital (how often an individual said they sought advice from others). In-degree for advice represents how others draw on a given individual for resources or social capital (the amount an individual was nominated by others as giving advice). To best measure impact of advice in a network, In-degree is the ideal measure to avoid status influence (i.e. bloated reporting of advice giving). Similar to the staff-tie regression, an egonet composition measure is run on the “who do you go to for advice” (advice-giving) matrix to obtain In-degree. An excerpt from that data output is provided below:

Table 8: Advice-giving EgoNet Composition excerpt

| Ego Net Composition | | | | | | | | |
|---------------------|----|--------|--------|--------|-------|-------|--------|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | Gender | f0 | f1 | p0 | p1 | Hetero | IQV |
| 1 | 1 | 0.000 | 3.000 | 0.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| 2 | 2 | 0.000 | 0.000 | 0.000 | | | | |
| 3 | 3 | 0.000 | 0.000 | 0.000 | | | | |
| 4 | 4 | 0.000 | 6.000 | 2.000 | 0.750 | 0.250 | 0.375 | 0.750 |
| 5 | 5 | 1.000 | 3.000 | 4.000 | 0.429 | 0.571 | 0.490 | 0.980 |
| 6 | 6 | 0.000 | 4.000 | 2.000 | 0.667 | 0.333 | 0.444 | 0.889 |
| 7 | 7 | 0.000 | 0.000 | 0.000 | | | | |
| 8 | 8 | 0.000 | 8.000 | 0.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| 9 | 9 | 0.000 | 4.000 | 1.000 | 0.800 | 0.200 | 0.320 | 0.640 |
| 10 | 10 | 1.000 | 3.000 | 10.000 | 0.231 | 0.769 | 0.355 | 0.710 |
| 11 | 11 | 0.000 | 0.000 | 0.000 | | | | |
| 12 | 12 | 0.000 | 10.000 | 3.000 | 0.769 | 0.231 | 0.355 | 0.710 |
| 13 | 13 | 0.000 | 4.000 | 3.000 | 0.571 | 0.429 | 0.490 | 0.980 |
| 14 | 14 | 0.000 | 13.000 | 3.000 | 0.813 | 0.188 | 0.305 | 0.609 |
| 15 | 15 | 0.000 | 0.000 | 0.000 | | | | |
| 16 | 16 | 0.000 | 1.000 | 4.000 | 0.200 | 0.800 | 0.320 | 0.640 |
| 17 | 17 | 0.000 | 7.000 | 1.000 | 0.875 | 0.125 | 0.219 | 0.438 |

From this output, column 1 identifies gender (male = 0, female = 1). Column 2 (f0) represents frequency nodes of same gender that are sought for advice. Column 2 (f1) identifies frequency nodes of opposite gender that are sought for advice. Column 4 (P0) denotes the percentage of ties that the node advice same gender, while column 5 (P1) represents the percentage of ties that the node advice opposite gender. Nodes 19 & 24 seek the most advice from actors of same gender (female) with 17 others reported. Node 24 seeks the most advice from actors of opposite gender (male) with 15 others reported. Among all nodes, females reported the highest number of actors in the network (both male & female) from whom they seek advice. This is female-to-female support within the community is consistent with visualization measures of female-exclusive friendship analyses as well as thematic reduction of qualitative analysis. Rows with missing data

for p1, p0, Hetero, & IQV fields are omitted for this analysis as these are nodes that either were non-responders or did not report seeking advice from any other actors in the network.

Table 9: Advice, Gender, & GPA Regression output

| Coefficients ^a | | | | | |
|---------------------------|-----------------------------|------------|---------------------------|--------|------|
| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| | B | Std. Error | Beta | | |
| (Constant) | 3.394 | .101 | | 33.536 | .000 |
| 1 f0SAME | .008 | .017 | .070 | .465 | .644 |
| f1OPP | .006 | .027 | .034 | .222 | .825 |

a. Dependent Variable: GPA

After running a regression with GPA, Table 9 confirms that advice-giving relative to gender is not a statistically significant predictor of higher GPA with a significance value of 0.825. Wording of this question could have impacted survey response as “advice” can be defined in a variety of ways (namely, social or academic). Although not statistically significant to predicting higher GPA, the collection of advice data (reciprocal) is useful to further analyze friendship network and critical network roles such as brokers.

The open response data from this study provides a significant amount of qualitative data about perceptions and personal feelings of satisfaction. This is valuable data that triangulates with centrality and friendship measures as it provides a node’s self-perception alongside relationship data reported by others in the network about that node. Specifically, over 84% of students indicated that being a part of this community contributed positively toward their academic success. When asked specifically “Do you feel that being a part of the Engineering community has contributed to your academic

success at Southern State Public University?", thematic analysis of student responses indicated the most frequently cited contributions included the convenience of being around students in similar classes/majors, help with homework and study groups, and the benefit of being around peers with similar goals. A selection of student responses to this open response question include the following:

- Node 83 (Male, ERC): "Being able to connect with a community of people with similar goals and classes has helped me challenge myself academically."
- Node 5 (Female, ERC): "Being a part of this community, I am able to collaborate with my peers for homework and in classes, as well as socialize."
- Node 13 (Male, ERC): "I feel that the Engineering Community has played a part towards my academic success as it has given me a community of peers to socialize and work with in order to do my best."
- Node 23 (Male, ERC): "I am able to collaborate with others who have the same interests and classes as me. This makes for easy homework help, studying, and a community atmosphere."
- Node 60 (Female, MAE): "Being in a living learning community with other students majoring in the same areas has been very beneficial. Study groups and close friendships have formed from living in Hamilton Hall. These students have aided my academic success tremendously and my freshman year would not have been as enjoyable without this experience."

Not only did the students above report great sense of community and positive academic gains, but these students also self-reported high GPAs (average of 3.76 for this sample of five students).

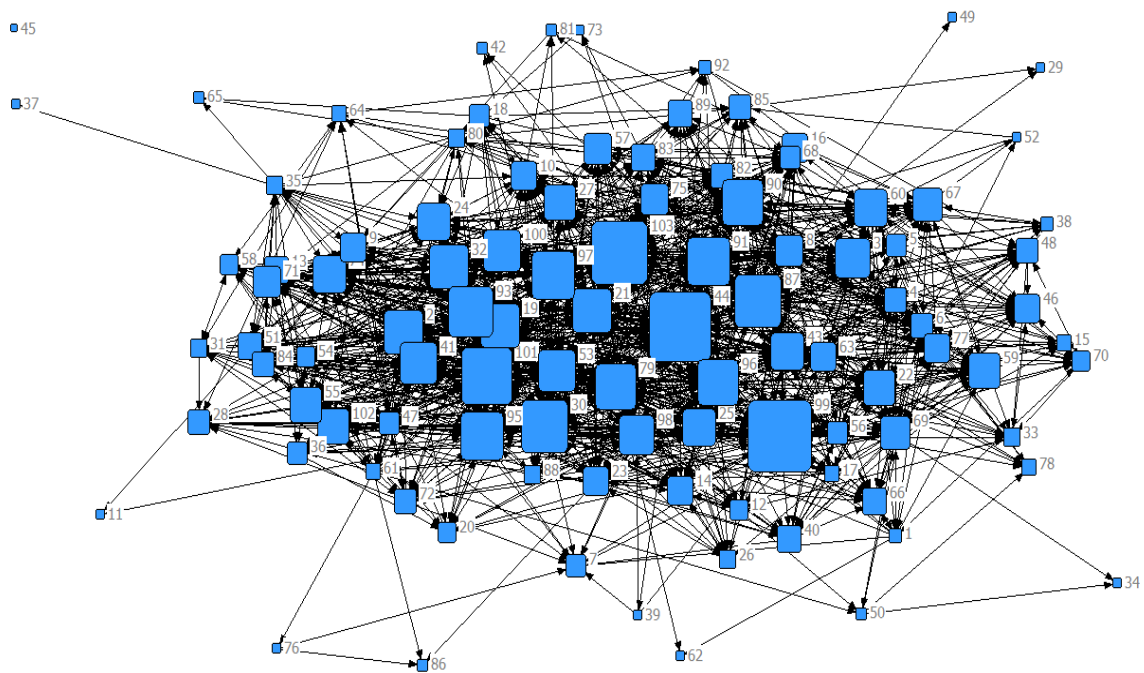
Furthermore, when asked "Are there any Engineering Community students in particular who helped you succeed academically?", every in-hall staff member was cited and approximately 46% of the total community population were explicitly named. This indicates not only a strong social connection among students in this community, but these students are also strongly connected through academic relationships and interactions. Of the 47 students explicitly cited when asked "Are there any Engineering Community students in particular who helped you succeed academically?", there were 7 students who were named more than 3 times. These 7 students can also be found among the most

centralized and broker nodes within the network. This indicates that while popularity may not be a sound predictor of higher GPA, there is a strong presence of popular students who are also viewed as academic “helpers” in the this community.

FRIENDSHIP CENTRALITY

Basic centrality was run on the dichotomized friendship matrix. This measure facilitated the identification of the networks basic structure and cohesion.

Figure 9: Friendship Centrality



Not only is this network remarkably connected, but it is also significantly cohesive. Additionally, this network is so dense that it is difficult to obtain a visualization that is not cluttered. Connectivity is the number of independent paths for maximum flow. The

more paths that connect two people, the more cohesion. Node connectivity is reflected as the number of nodes to be removed in order to disconnect two particular actors in a network. Cohesion can also be defined as the ability to be disconnected. Density is represented by the number of ties divided by the number of possible total ties. Density is the most effective way to look at group cohesion and can be further examined by looking at average tie strength and average adjacency matrix.

All nodes (except for one non-respondent) are tied to others in the network. Node 45 did not respond to the survey and this may very well explain the lack of relational data (the presence of outgoing ties could show some network connectivity, even if not reciprocated). Largely, peripheral nodes here are survey non-responders as well; however, even with that missing data they are still tied to the network through at least other individual. Among the highly centralized nodes (denoted by greater node size) are both student and staff members.

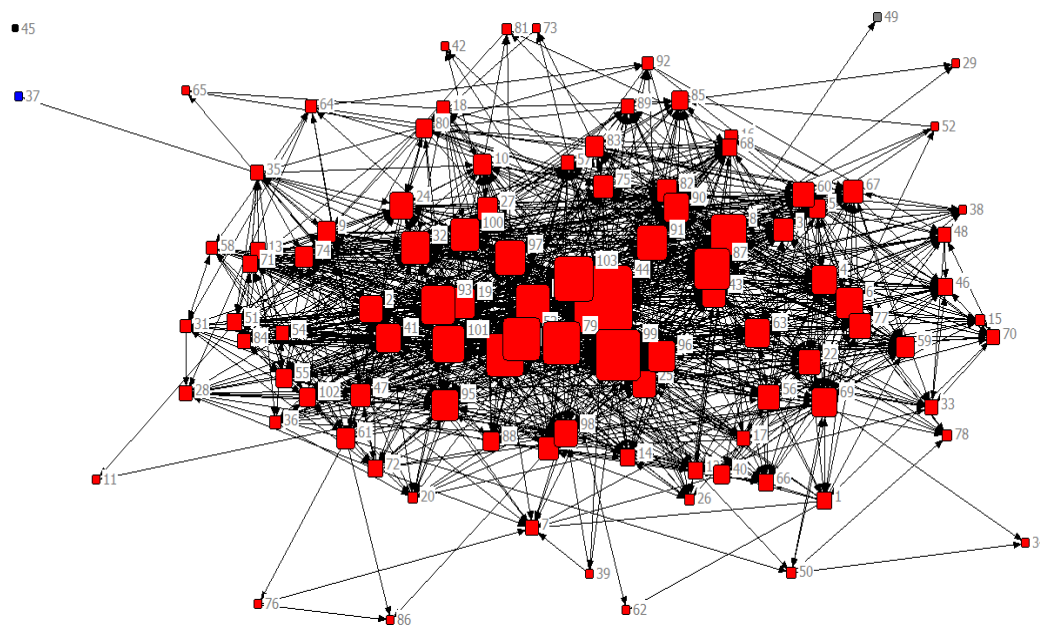
This data visualization alone confirms that this learning community is achieving a primary goal: this learning community has developed a network of individuals who are no longer strangers (as they were the first day they moved to campus), but are now friends. This quantity of relational ties also indicates that social capital can easily flow through the network. Social capital is further examined through the broker role and relevance to structural holes.

FRIENDSHIP CENTRALITY & BROKERS

Using the friendship matrix and running centrality measure for structural holes, we are able to quickly identify the key brokers in the network. Brokerage is defined as

the act of an actor being positioned between and connected two other nodes, this actor bridges the gap between these two nodes and facilitate information and/or social capital flow (Burt, 2005). These students are, in essence, the gate keepers between populations of others. These are important nodes in the network because they are the linking piece between others who may not otherwise share any connections. Not surprisingly, many of the most significant brokers in the network are hall staff and the most highly central students.

Figure 10: Brokers within Friendship Centrality



This visualization provides size variation to distinguish greatest brokers as largest node size. Not surprisingly, some of the most highly centralized students that are brokers are also among those most highly sought-after for advice (Nodes 30, 79, 87, 21, & 44). Related to brokerage roles are the concepts of structural holes within a network. Structural holes are an interesting analysis opportunity within ego networks as they can

be a critical variable in understanding and predicting the behavior of the focal node (Hanneman & Riddle, 2005). Social capital is examined via structural holes. The degree that friends are not connected to each other is the effective size and constraint; this is measured by betweenness centrality. Notably, nodes 44, 99, and 103 are not only very central but also notable brokers within the network structure.

Similar to the extrapolation of highly connected and centralized nodes for GPA analysis, these nodes can be examined based on network position and academic major. This simple sample and analysis presents an opportunity see if particular academic major within the College of Engineering emerge as among the most influential students in the community.

Table 10: Broker Nodes' Engineering Majors List

| <u>ID</u> | <u>Gender</u> | <u>Community</u> | <u>Major</u> |
|------------------|----------------------|-------------------------|------------------------|
| 21 | Male | ERC | Electrical Engineering |
| 24 | Female | SEAM | Chemical Engineering |
| 27 | Female | ERC | Chemical Engineering |
| 30 | Female | ERC | Chemical Engineering |
| 32 | Female | ERC | Materials Engineering |
| 44 | Male | ERC | Mechanical Engineering |
| 79 | Male | ERC | Chemical Engineering |
| 87 | Female | SEAM | Mechanical Engineering |
| 93 | Male | ERC | (did not report major) |

Among the most core students in the community, Chemical Engineering is the most represented major following shortly thereafter by Mechanical Engineering. Given that at

least two other majors are included in this very centralized core group, it stands to reason that Transactive Memory effect could be in effect in this scenario as students may develop areas of expertise to share with the group (Wegner, 1985). This expertise makes them highly valuable and pursued by others in the network, thus resulting in a greater centralized location. Additional regression measures with major and centrality should be done to thoroughly examine these cursory correlations.

Due to the remarkable density (connectedness) and strong degrees of centrality within this network, structural holes are a minimal aspect and not examined in detail for the purposes of this study. Minimal structural holes within this dataset exist within periphery nodes and are likely impacted by the non-respondents lack of relational data provided. The density and cohesiveness of this network indicates that this is a group of individuals who are highly relational, indicating an environment ripe for communication, resource sharing (capital), and knowledge acquisition and authorship.

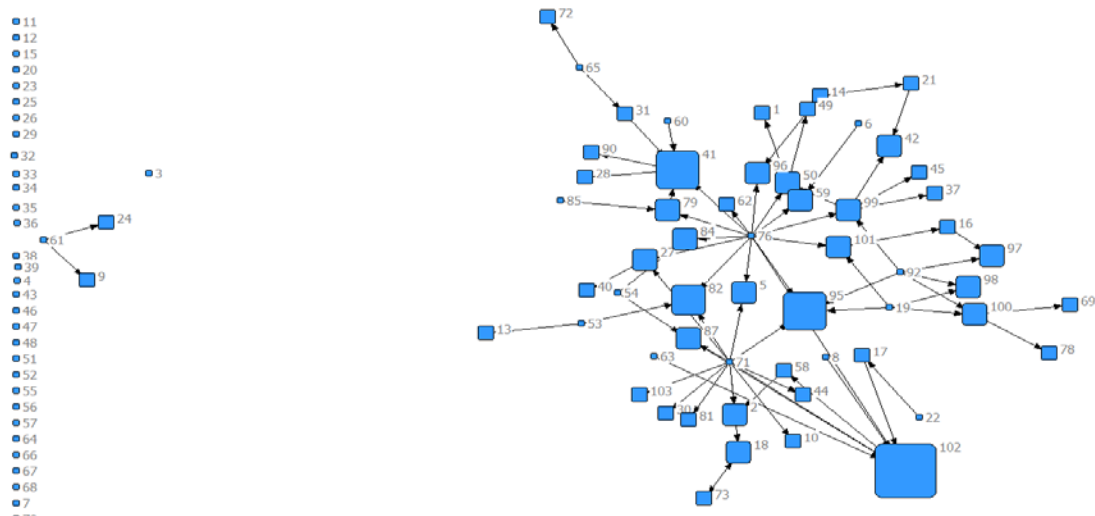
ADVERSARY CENTRALITY

Just as important as the brokers in a network, sometimes adversarial (or controversial) individuals also reveal an interesting dynamic within a network. Adversaries are a relatively rare dataset to come by in SNA as this is a more controversial relationship type to report on (i.e. people don't like admitting to the fact that they have enemies or may even be perceived as an enemy by others). For this reason, the small amount of adversarial data that was provided by survey respondents is examined below.

Larger nodes are those who are most disliked by others (i.e. individuals most reported as an adversary by others in the network). Smaller nodes with more directional

ties going out, or away from, the node are those individuals who most frequently cited others as adversary (i.e. disgruntled students). Nodes without directional ties (far left) are those who did not cite anyone as an adversary and no one else in the community cited them as an adversary.

Figure 11: Adversary Centrality



There is minimal number of relations reported as adversarial in this network, consistent with the high degree of friendship identified in thematic analysis and confirmed in relational measures. Interestingly enough, two of the four primary controversial (adversarial) individuals are actually staff members. Triangulation with the analysis of the open-ended questions reinforces this disenchantment between a few students and these staff members. A resident advisor is in a position ripe for such circumstance as they are also charged with enforcing hall policy; as such, these staff members could easily be perceived as the “enemy” or policing force. The other two nodes with high adversary roles are both high GPA male students.

Also affirmed in the thematic analysis of open-ended response questions are the students who report multiple adversaries (or the disenchanted students). While no reason

is available for why these students feel they have many adversarial relationships within the community, these relational ties match their responses of feeling lackluster about the community and the people in it. The key take-away from this analysis is that the overwhelming majority of the students in the community do not report any adversaries, further reinforcing the cohesion and strength of friendship measures.

CONCLUSION

While preliminary regression analysis reveals that variables such as popularity, advice-giving relative to gender, and ties to staff are not statistically significant in predicting higher GPAs, an abundance of results and analyses here do confirm that the community is attaining classic learning community goals. This community is effective in establishing familiarity (density and cohesion) and even more so, providing an environment that fosters capital flow and friendships among participants and staff (friendship network and strength of tie analyses). Staff members in the community are highly central (well known), serve as among the most central brokers, and are cited in thematic analysis as among the most helpful aspects of being in the community.

Additionally, in this highly connected network the students who are most highly sought for advice are also highly present as brokers. This indicates that there are some emergent leaders with diverse and numerous ties within the network. All of this positive network structure indicates that this group is not only highly supportive but it is a structure that encourages capital flow and acquisition. When given the final opportunity for reflection on the community experience, friendship is the most popular theme for the “additional feedback” open response and followed closely behind with academic and learning oriented responses. These results triangulate well with the network

measurements of strong friendships and connectivity, the outstanding self-reported GPA average, as well as student feeling of academic support and success. These results provide confirmation of this Engineering Learning Community attaining basic goals and serves as a strong model for success.

Southern State Public University, like many other institutions of higher education, has a goal of retaining students and specifically retaining them on campus. Since living on campus is so highly related to academic success and satisfaction measures (Tinto, 2003), proven methods of engaging students successfully on campus are highly desirable for campus administrators. A good indication of a student's satisfaction with his/her learning community membership is how they reflect on their experience and if they would recommend it to others. A selection of student open responses to the opportunity to provide any additional feedback at the conclusion of the survey included the following:

- Node 57 (Male, ERC): "Being a part of this community is one of the best decisions of my college career!"
- Node 81 (Female, ERC): "I found the community highly successful and would suggest future engineering students to this wonderful program."
- Node 53 (Male, ERC): "It's been a great experience and I wouldn't have done so well the first semester without it."

Furthermore, for students in this community who completed the survey, approximately 43% reported a desire to return to the Engineering community next year and an additional 16% were not sure at the time of survey completion (approximately 6 weeks prior to the conclusion of the 2013-2014 academic year). This strong desire to return to campus and specifically to this learning community is positive reinforcement that this program is serving students well and modeling a structure for strong campus retention.

CHAPTER 5: SUMMARY, LIMITATIONS, & SUGGESTIONS FOR FUTURE STUDIES

SUMMARY

The focus of this study was the examination of networks among contemporary residential community students in higher education. The research question directing this inquiry was: How does one's role within a residential community of peers relate to success in college? This study was designed to explore the possible connections between student peer relationships and one's personal role in a network as it pertains to outcomes such as self-reported academic achievement and personal satisfaction with the first year of college. Academic achievement was operationalized as self-reported GPA and personal satisfaction was measured by friendship network, connectedness and centrality measures, as well as positivity/satisfaction terms as emergent in thematic analysis. While this study was largely exploratory in nature, it utilized community of practice framework with social network analysis as a method of exploring the impact of relationship development and integration in a group of peers.

The setting for my study was a 4-year, public institution in the southern portion of the United States that is moderately selective, non-urban, with a reasonably well-established learning community program. Southern State Public University has an enrollment of approximately 20,000 undergraduate students with an Engineering Learning Community established in the early 1990's. The Engineering Community is actually comprised of two community concepts that are housed within the same residential building (Hamilton Hall): The Engineering Residential College (ERC) and

Management And Engineering Community (MAE). This learning community was a wonderful sample to utilize for my survey because it constitutes a diverse group of students who share a common interest and similar goals, echoing the broad applicability of this model as it serves as a microcosm of the contemporary college student experience.

The goal of this work was to study a sample of individuals interacting in community with one another in an effort to identify the unique roles of the individuals and understand the relationships that develop between them. This study permitted the examination of relationships and network position relative to success and satisfaction for college students. With the community of practice lens and network analysis application, this research provides greater understanding of what happens within such communities. The existing literature provides robust accounts of co-curricular peer learning environments, diversity of research methods for assessment of such programs, and ample theories framing why such communities garner positive outcomes. This study helps to fill the gap with an exploration of how students in community learn from one another through their relational ties and exchange of capital. This network analysis provided a visual representation of those community members and quantifies the roles, relationships, and attributes that contribute the greatest to success.

This mixed-method analysis was specifically designed to incorporate qualitative components for thematic analysis and collections of student narrative utilized for network outcome triangulation. The roster-based network question provided a rich and full dataset that resulted in an incredibly cohesive and dense network. With this data, a broad variety of network measures as well as linear regression models incorporating academic variables were processed for statistical significance and program analysis.

Data from the survey were analyzed via standard statistical measures (descriptive statistics), thematic analysis from student open-responses, regression model analysis, and a selection of network analysis maps to that displayed the dynamics and multiple attributes of the community. Examining both the full network as well as utilizing select ego network compositions provided depth for node position and relational analyses relative. This approach provided network structure information and flow along ties relative to capital acquisition and transfer, an ideal match of community of practice theory and network analysis methodologies.

The survey was available from February 20, 2014 until March 5, 2014 and these fourteen days produced a network response rate of 85.29%. With such a high response rate, the survey data was rich including both student and staff survey participants. The qualitative component of the survey was facilitated through a variety of open-ended, Likert-scaled, and binary questions. Overwhelmingly, thematic analysis of these responses produced positive feedback about community experience, participation, and overall satisfaction. Notable results from the non-network questions include: over 94% of survey participants report understanding the purpose of the learning community and over 97% report friendships with others students in the community. Over 83% reported participation in community events and a significant 93% reported enjoying being a part of the community. Over 91% felt that learning community membership contributed positively to the overall college experience and over 84% reported that being in the community contributed specifically toward academic success. These statistics alone indicate that this is a highly functional and successful learning community.

The high degree of connectedness (97%+ friendship) and participation (83%+ capital flow) indicated that this group is also ideal for a network study. From the roster-based network questions, the data obtained was utilized in a variety of regression models and network analyses.

While this network study indicated that popularity, relational ties to staff, and being someone sought-after for advice were not statistically significant predictors of higher GPA, the network analyses conducted confirmed strong network density, cohesion, and proper structure for ideal capital flow. Not only does this network reveal a high degree of connectedness but the strength of ties is also robust (high percentage of “close” friendships). Between this variety of ties, a group of highly centralized nodes, and a collection of critical broker nodes, capital flow and acquisition is quite significant based on network structure alone. Given the high degree of centrality of staff members and their connectedness with students, the staff members are also effectively supporting the community’s goals by fostering relationship development and capital flow. Through this social engineering of a learning community and the staff who help facilitate it, students are able to engage in academic and social experiences that reap significant relationships, academic achievement, and sense of belonging (Blimling & Schuh, 1981).

The aforementioned broker nodes are centrally positioned in the network with a few additional brokers who serve in pendant positions and help draw peripheral nodes more central. This contributes positively to network density. Not surprisingly, given the robust friendship network, there is a significant advice network indicating that students not only report others as friends but have relationships where advice is given to and sought from a variety of others in the community. This reveals a level of deeper relation

involving trust and loyalty, again another indicator of a highly developed network system rich with relational ties and capital flow. While significant predictors of higher GPA within a learning community were not identified from this study, this research does provide insightful information about an effective community's inner workings (relationships and flow along those ties) and examples of network structure that support positive community.

SIGNIFICANCE OF FINDINGS

This research study sits at the intersection of three primary areas of scholarship: 1.) historical relevance of residential communities in higher education, 2.) learning communities (both models of and contemporary applications) 3.) literature pertaining to the theoretical framework of communities of practice (including contextual information regarding social capital & social networks). Additionally, the innovative use of network analysis as a means to quantify the impact of roles and relationships within such a community of residential students positions this study uniquely in the literature. This contemporary approach to a well-established body of literature adds depth and breadth to the ways in which we can better contribute to student success, acclimation, and satisfaction with the college experience. The application of network analysis methodologies through a community of practice lens extends the existing research on learning communities and fills a gap in the existing research regarding the inner-workings of such structures.

Firmly rooted in a rich history of residential communities with a commitment to student success and development, contemporary learning communities represent a lineage

of programmatic and structural intentionality. From the early Oxbridge residential college models to the Harvard houses, learning communities have over a century of investment in the collegiate student experience and success (Adelman, 1969; Duke 1997). The findings of this study confirm that this contemporary learning community has met among the most foundational goals of historical models. Meiklejohn's Experimental College and Dewey's progressive school models provide a foundational value in shared learning experience through personal experience, collaborative learning, curricular continuity, faculty involvement, and the creation of a place of intimate association both inside and outside the classroom setting (Tinto, 2003; Smith et al., 2004; Duke 1997, Ryan, 1992) . These historical models were re-imagined in this particular Engineering Learning Community through the integration of cutting edge resources (i.e. advanced incorporation of technology, new residential space/building, customized programming and field experiences) and significant involvement of stakeholders (i.e. connected courses, dedicated faculty, professional engineer-in-residence, specially trained in-hall student and professional staff). The measured outcomes presented by this study are not only affirmation of the robust history of residential colleges but also a promising look into the future of contemporary models and impact on student success.

The results of this study extend a great deal of existing learning community literature and research. Situating this research in community of practice literature explicitly: the "domain" of this study is the Engineering Learning Community (comprised of both ERC and MAE student), the "community" identified as the 102 individuals who are members, and the "practice" is the shared experienced of those individuals through living in the same on-campus residence hall, sharing classes, and out-

of-class experiences. The high response rate (85.29%) to this study indicates a solid representation of perspectives and reported relationships among individuals in this network. Specifically, this extends the work of Wenger regarding the function of people being together in a shared experience will give rise to the exchange and management of capital (Wenger, 2004). Learning community research regarding the importance of the formation of a supportive group of peers (Tinto & Goodsell, 1994) is further extended with this study through the over 97% of respondents reporting that they formed friendships with others in the community, “friendship” and “support” as consistently emergent in the thematic analysis, and further verified through the knowing and popularity network analysis. As evidenced through the thematic analysis of support with classes and enjoyment of connected classes, this community’s Knowing Networks and strong friendship ties confirm network density and effective capital flow along ties (capital acquisition and exchange). This study further confirms the effectiveness of a learning community’s ability to create salient connections between the student and institution that have been proven to produce significant outcomes such as increased GPAs, higher retention rates, and persistence to graduation (Kuh et al., 1991; Curtin, 2001; Ryan, 1992; Astin, 1984).

The Knowing Networks visualize the very connected nature of the network structure. The strength of tie networks further distinguish that not only are students in this community very familiar with one another and have friendships, but a significant portion of those relationships are reported as very close friendships. This cohesion, density, and strength of tie validate previous research relating network structure to student satisfaction and development (*The Student Learning Imperative*, 1996; Ryan,

1992; Schlossberg, 1989). Furthermore, the individuals that contribute to a community of practice bring diverse perspective, skills, and knowledge to the group. These contributions facilitate knowledge sharing and the process of learning in a social setting, a point that is paramount in understanding the value of communities of practice especially in a diverse learning community setting (Wenger & Snyder, 2000).

This study reveals a highly connected network that also reports over 85% of respondents reported participation in community activities. More than one quarter of those who participated in the survey also reported that the community provided social opportunities to connect with like-minded individuals and the sense of support (academic and social) provided by such peers was particularly influential on their positive experience. These findings support prior research that student engagement is indicative of community development which is linked with persistence and academic success (Kuh et al., 1994; Tinto, 1998). Findings in this study reinforce the work by Tinto & Goodsell in 1994 including their primary outcomes of learning community participation greater student engagement in courses, increased academic activity such as study groups, and more significant engagement in the life of the college.

The average self-reported GPA for these students is 3.46 and is 0.09 points higher than the first-year learning community average GPA (Fall 2013) and is 0.47 points higher than the overall university first-year student average GPA (Fall 2012). This confirms prior research citing that learning community students often have higher GPAs than their peers not involved in such communities (Edwards & McKelfresh, 2002). Additionally, over 84% agree that being a part of the community contributed toward their academic success. Thematic analyses indicated that among the most helpful academic aspects of

the experience included help with homework, opportunity for study groups, and simply being enrolled in the same classes as others in the community. Additionally, more than half of the respondents provided specific names of individuals who specifically helped them succeed academically and those individuals listed were among the most central students in the community. Existing literature affirms that students involved with learning communities are more likely to persist through graduation (retention), attain greater academic success, connect with peers and develop social networks, communicate with faculty and staff, and overall claim to have more successfully made the transition from secondary education to post-secondary (Tinto, 1998). A highly central female ERC student specifically spoke to this topic, “ Being a part of this community has helped me transition from high school to college really well and gave me a good foundation to get settled.”

Centrality measures on this network reveal that staff members are widely known and integral to network structure and there as well a great deal of students in both highly centralized and broker positions. Egonet measures further emphasize the importance of node position within the network, extending previous research that emphasizes the value of diverse and dense networks (Lave & Wenger, 1991).

With over 92% felt that being a part of the community positively contributed to their overall experience at the university, it is no surprise that when given an opportunity to provide any additional feedback regarding the experience, survey respondents were nearly ten times more likely to share positive feedback than negative commentary. Specifically, students took the opportunity to emphasize the value of academic support, opportunity to learn from others, develop friendships, experience a sense of community,

and reference encouragement or connectedness. A sample of student open responses exemplify these themes”

- Node 23 (Male, ERC): “The ERC provides a sense of belonging for the students and allows ease of access to many resources that will be helpful to our schoolwork and future.”
- Node 60 (Female, MAE): “I grew closer to the people living here because we have similar classes. The Engineering Community has been very beneficial to my first year as a student at UK.”

This qualitative data is consistent with prior studies revealing the significantly positive regard of students for their learning community experience (Matthews et al., 1997; Curtin, 2001).

Student satisfaction is not only measured through quantity and strengths of relational ties, but also through more complex relations such as advice exchange. Measurements of advice sharing indicate that there is significant capital flow along relational ties. This indicates that the acquisition and exchange of knowledge through friendships in the network affirms the thematic results of feelings of peer support academically and socially. This type of engaging relations adds richness and complexity to the structurally sound network structure and facilitates more effective capital flow (Smith et al., 2004; Wenger et al., 2001; Wenger & Snyder, 2000).

Similar to the dark side of social capital literature, adversarial relationships are more infrequently discussed in learning community research. Adversarial relationships in this study reveal a small minority of individuals who report negative relationships with others in the network but are not confirmed through bi-directional ties. Thematic analysis also reveals a small number of responses with themes of dissatisfaction and negative experience associated with those peripheral individuals. Future research in this area may produce best practice for helping to avoid and/or reducing the impact of negative

experience, expectation management, and opportunities to better engage more peripheral individuals (Jaffe, 2004).

Aside from this very small minority of adversarial individuals, the overwhelming majority of the network confirms measures of connectedness, centrality, and strong relational ties. Given the connectedness of the network, variety of relational ties, and presence of both highly centralized/integrated as well as broker nodes, this structure is well suited for effective capital flow and acquisition. The three key principles of self-authorship are validated through this community structure in that capacity to know is confirmed through high GPAs, learning is situated in the experienced through shared courses and experiences, and meaning is mutually constructed through those shared experiences, relationships, and spaces (Kramer 2007). These findings are consistent with models of self-authorship outlined in existing literature (Kramer, 2007; LMP, 2004). In this study, students are developing the ability to construct knowledge and importantly, doing so alongside their learning community peers (Tinto, 2003). Given the density and relation-rich nature of this community, this positive environment is able to foster more complex and self-authored levels of meaning-making for the students involved. Building this scaffolding facilitates student development, which effectively creates a student transformation from dependence on external authority to self-authorship (Perry, 1970; Sanford, 1967; Kramer, 2007; Smith et al., 2004).

The student development component of learning community literature is robust for good reason. This study further reinforces the important role of relationships and experience on the cognitive and social development of students in their first year of college. This study models a measure of internal authority with an assessment of the

learning, relationship development, and influence of environment that happens between and among the students in this community (Kramer, 2007; Kuh, 1981). The strong academic performance (high GPAs), significant degree of relationship development (dense, highly connected, and strong relational ties within the network), and high degree of both social and academic activity involvement found in this study both affirm and extend significant learning community works (Lenning & Ebbers, 1999; Ryan, 1992; Curtin, 2001).

Learning communities are commonly cited as programs that effectively integrate academic and social aspects of a student's collegiate experience (Tinto, 1998). Addressing both the curricular and co-curricular experiences by design promotes student achievement and has earned track record of success. Exemplifying this intentional incorporation of academics are the most widely referenced learning community models as developed by Lenning and Ebbers as well as Shapiro and Levine. Whether through linked classes, coordinated studies, course clusters, faculty involvement, research opportunities, or by virtue of program organization by academic discipline or major, the theme of academic intentionality is equally as important as the social development efforts for learning community success (Hurd & Stein, 2004; Lenning & Ebbers, 1999; Shapiro & Levine, 1999). A learning community program with only social aspects does not produce the same degree of academic achievement results and ultimately produces results similar to social clubs/organizations (Terenzini et al., 1999; Pemberton, 1996).

A male student in this ERC (node 23) spoke to the benefit of both relationship formation and the value of academic resources, "The ERC provides a sense of belonging for the students and allows ease of *access to many resources* that will be helpful to our

schoolwork and future.” This narrative echoes the numerous studies that confirm learning communities streamline access to academically beneficial resources such as tutoring, technology, faculty involvement, and facilitation of study groups and linked courses (Lenning & Ebbers, 1999; Whitt et al., 2008). By design, learning communities that integrate the academic and social experience reap the greatest reward in terms of student success in higher GPA and satisfaction measures (MacGregor & Smith, 1992; Edwards and McKelfresh, 2002). This history and research indicate that academic achievement and personal satisfaction are correlated with learning community involvement in programs with intentional incorporation of academic and social components.

Although a higher GPA could not be attributed to an individual’s popularity, degree of connectedness to hall staff, nor the amount of advice they dispense to others in the network... this study did produce significant findings relative to relational develop, capital exchange, and perceptions of success among students in a learning community. The quantitative results of this study alongside qualitative thematic analysis that repeatedly echoed the students’ satisfaction with the experience, sense of community/support, and reports of academic as well as social/personal accomplishment confirm this learning community is meeting core goals. Network measures revealed this community to be remarkably well connected and dense in terms of strength of relationships. Given that peer group relationships influence both affective and cognitive development (*The Student Learning Imperative*, 1996), it is important to note that this particular study confirms and extends prior work on the value of student-to-student interaction and the significant impact on student development (Astin, 1993). Considering this group of friends were complete strangers one semester prior to this study, this

learning community structure, staffing, and support should serve as a model for other community concepts struggling to establish connectivity and a successful student experience.

LIMITATIONS

As is the case with any research study, a collection of limitations must be acknowledged to qualify the methodological choices made and acknowledge restrictions of this particular study. For this research, the three primary limitations of the study included limited scope of study, self-report method of SNA surveys that may impact responses, and limitations of centrality measures with SNA.

Specifically studying one learning community does restrict the type of analyses conducted. The community is among the most established at the institution and has a history of significant stakeholder support that newer communities are not yet able to boast. For this season, the outcomes of this particular study may not be replicated with the examination of perhaps a newer community at a small institution. This limited scope does provide a narrow snapshot of a learning community structure and function; however, the specific selection of this community does lend assessment models that can be customized to other community analyses.

The second limitation of this study is the nature of SNA studies and potential impact on survey response. SNA studies must always be developed with a great deal of sensitivity to best reveal personal relationship information. There is always a risk of skewed respondents who feel embarrassed to reveal the nature of their relationship with others in the network. This requires careful data analysis and review as well as following

SNA best practice to ensure anonymity in the report of study results. The roster portion of the survey format was developed by utilizing the Student Affairs provided report of official Engineering Learning Community (ERC & MAE) names. Unfortunately, these names were all official names from the University system of record and did not account for students who prefer to be known by a nickname. Data for students who are known by a nickname may not have the most accurate network position and relational data representations as identification could have been skewed (i.e. student don't realize that "James Smith" as listed on the survey is actually their friend "Jimmy" due to the nickname issue). The self-report method required for SNA can produce findings different from what participants *actually* do in situations. Since a respondent may view the survey as a way to report in a preferred way of viewing oneself, researchers and analysts must be vigilant to review bidirectional ties and closely examine strength of tie measures.

Since centrality degree doesn't fully reflect the detailed nature of a tie, this is the third limitation of the study. More work must be done to expand on the nature, quality, and related impact of the relationship beyond just centrality degree (i.e. we are friends, but are we more congenial acquaintances or closer friendships who share more personal experiences). This simply requires additional assessment and strategic planning for data collection. Centrality is the central feature of network analysis and does provide incredibly valuable information. However, centrality measures must be developed carefully and with the qualification that additional SNA analyses such as homophily, embeddedness, and eigenvector centrality. These items are discussed in great detail in Suggestions for Future Studies section below.

SUGGESTIONS FOR FUTURE STUDIES

Future research should include faculty members associated with the community and examination of student-teacher, student-mentor relationships. This would extend Shapiro & Lavine's 1999 and Jaffee's 2004 research regarding the impact of relationships with faculty on student experience. This is significant because early claims suggest that students are more likely to persist through graduation if personal connections are made with students and faculty (Jaffee, 2004). Examining a network structure that includes faculty could reveal more about the nature and types of faculty roles that have greatest influence and impact on a learning community network.

Additional benefit of SNA application to advance the work of learning communities in higher education is with the ever-present transfer population. Students who apply to an institution after the traditional first year or transfer mid-year often experience greater transition challenges (Terenzini et. al, 1999; Tinto, 1998). Use of SNA with learning community networks allow community leaders to identify key opportunities and people to help acclimate new students into a community dynamic. This enhances the transfer students experience by making it more seamless and positively contributes to measures known to impact retention (Tinto, 2003; Magolda, 2004).

Multi-institution learning community SNA studies would allow for benchmarking and measurement analyses. This methodology would be a brilliant contribution to existing national studies of learning programs that rely more heavily on thematic analyses from qualitative measures. This could not only provide opportunity to share best practices, resources, and assessment methods on campuses across the country (or

internationally) but could also facilitate scholarly growth by identifying leaders in this ever-expanding area of educational research and literature.

Specific network analysis measures that would prove insightful for future studies include closer examination of embeddedness, homophily, as well as cluster and egonet measures. Embeddedness can be relational or structural in a network. Relational embeddedness does not look at third parties; rather it explores in greater detail the actual dynamic such as friendship, colleagues, etc. Structural embeddedness looks at the network more holistically and how ties among alters in an ego network can ultimately impact ego directly (though they may be adjacent relations). The more nodes in common between two actors in a network, the more connected they are. Embeddedness offers benefits such as richer relationships, cooperation, resource pooling, knowledge transfer, etc.

Homophily is a description of likeness within a network. For this measurement in UCINET, reciprocal data is required but generally highly available in network studies in the form of friendship, familiarity, or advice ties. Since this particular learning community is so dense and connected, homophily is a redundant measure. This measure would prove, however, very helpful for future studies of learning community that are less cohesive. Homophily is run on network outside of ego as this balances the nature of communication breakdown. The External/Internal Index (EI Index) is the number of external ties divided by the number of internal ties. When the EI Index is negative, there are more internal ties and the group is more homophilous. The more positive the EI Index, the better because this indicates that people work well with others outside of their own group (ego network). A value of -1 indicates a perfectly homophilous group;

meanwhile an EI Index value of 1 indicates a perfectly heterophilous group. EI Index is a particularly helpful measure when examining multiple communities across a campus for a measure of homophily among the collection of networks.

Additionally, subsets of the larger network or clusters may be of interest for specific study particularly if a researcher is interested in highly centralized students, student staff (resident advisors), or even peripheral clusters. UCINET provides data extraction functions that allow the researcher to focus on specific portions of the actors (nodes) in a network. Specifically, the largest main cluster of nodes can be extracted; however, this action does remove any isolates. Beyond extracting the largest component of a network for analysis, pendants can also be removed to extract nodes or cases (clusters of nodes) that are connected to the larger group by only a singular node. This is helpful in information flow or knowledge transfer examinations of specific populations or cliques within the network. Cluster and ego network analyses are helpful in networks less dense than the one examined in this study as they are useful measures to better examine significant holes within a network structure. Larger learning communities or studies involving multiple communities would benefit by these measures and related analyses.

Another useful application of centrality is to examine ego (or individual ego networks). By examining an individual at the center of the network map, additional information regarding node ties and relationship to academic measures such as GPA and retention may be inferred. The ego network can help visualize the relational data by thickness of line depending on the nature of the relationships reported. Thicker lines indicate greater degrees of friendship or relationship. Ego networks also permit the examination of broker roles (node that ties one or more groups or individuals to each

other) and structural holes. Ego networks reveal critical information about the nature of a node position as well as the potential for influence on the network. The Egonet feature within UCINET allows the researcher to select a specific node and the immediate “neighborhood” of connected nodes becomes the focal point (Hanneman & Riddle, 2005). This is most commonly referred to as an ego and the alters (focal node and the related/tied other nodes) and is often helpful to simply examine sheer size of the network. Ego networks are as unique as the participants who respond to a network study; these networks may be dense and highly integrated or sparse with isolation indicators. Egonet analyses are particularly useful in network structures with significant structural holes. A great deal of work has been done in developmental psychology regarding ego networks in regard to social support and is a great way to further study key nodes such as brokers or those who are highly centralized.

Finally, an examination of the most centralized and widely known nodes may provide a fascinating look at the individuals of greatest influence on a network. Such an examination is particularly useful for nodes that are most highly sought after for advice, have many friendship ties, and are deeply embedded in the center-most part of the network structure. These nodes experience “celebrity effect” where they are so widely known within the network that they are recognized as a useful tie based on status, often this status and place within social hierarchy are self-reinforcing (Magee & Galinsky, 2008). For larger learning communities with members from a variety of student grade levels, this type of measure may reveal interesting phenomenon about perceptions such as popularity, seniority, and leadership within the group. Learning more about the nodes of

greatest influence on a network stands to greatly benefit the learning community literature and network research broadly.

APPLICATION FOR PRACTICE

This study applied community of practice as a lens to uncover more about what happens within a learning community. This examination of internal community dynamics, structural significance, relationship development, and capital flow not only contributes a model that is easily replicated for future studies but also establishes a network analysis practice for residential communities. This study helps to inform practice for faculty and administrators as a method to create more educationally purposeful environments that can benefit student GPA, retention, and graduation rates.

The robust history and breadth of learning community literature provides a significant foundation of both research method and best practice. Among the contemporary literature, a call to action for future research consistently requests best practice for helping to avoid and/or reducing the impact of negative experience, expectation management, and opportunities to better engage more individuals (Jaffe, 2004). Consistently, the assumption is that learning communities are good for students due to the influence on their development (personal and cognitive) as well as acquisition of academic capital, yet minimal research had been completed to explore *how* this happens. The findings of this research help to fill this gap.

Learning community scholars and experts could readily agree that there is a great deal this particular community is “doing right”. Over 93% of students who participated in this study reported that they enjoyed being a part of the community and over 91% felt

that their community members contributed positively to their overall collegiate experience. This research provides a model of a successful learning community model that is effective in relationship development/support and structurally effective for capital flow and acquisition.

The staff structure is an ideal model as research measures reveal these individuals as highly integral within the community structure, significant brokers, and cited by students as among the most helpful attributes of community membership. The student (resident advisors) and professional staff (hall director, engineer-in-residence, and office assistant) engage in routine training specifically developed for support of a residential learning community. This training and the staff commitment to success is evident in their centralized role in the network and strong degree of friendships as reported by students.

The Engineering Learning Community also exemplified a commitment to regular involvement opportunities for students. Weekly events including a social hour and tutoring night were not only regularly attended (over 83%) by students but also cited as among the most beneficial events of the community. Given that relationship development and involvement are pillars of effective learning community establishment, this community further solidifies itself as a best practice model. The combination of a highly trained staff, regular opportunities for involvement, a physical space that encourages and facilitates interaction, as well as a shared learning experience through academic connections positions this community well for the aforementioned outcomes of student success and satisfaction.

Examining this community structure through community of practice and with an application of social network analysis methods provided an opportunity to measure

within-community dynamics. SNA permits the visualization of network position by revealing both predicted and expected relationships, nature of interactions, and quantifies impact of said ties. This methodology is particularly useful for those interested in examining the impact of learning community participation and students. This information can be used to identify key students or stakeholders within a given community or as foundation to establish connectedness and related goals (i.e. community should foster relationships and those relationship lead to retention, academic success, etc.). This is a great method to identify students who may be potential peer mentor candidates, those who are highly involved and central to the network thus possessing a great deal of influence within the network structure. Student organization and leadership group network studies would reveal a great deal of information about emergent leadership nodes and critical brokers within students communities. On the contrary, such network analysis is also a great way to identify students who are more peripheral to aid in supplemental outreach to facilitate more or stronger relationships. Higher education administrators and stakeholders may be particularly interested in this information as it may inform future decisions related to resources, funding, and structure to best engage students and attain goals.

SNA offers a candid view of a network and this methodology would also prove useful for assessment and research. Being able to identify highly centralized students or those with significant brokerage power, allows stakeholder to leverage that influence to positively impact the network at large. For example, these students may be appealed at the idea of serving as an ambassador the following year or becoming a part of a community's marketing or outreach team. Given their network position, these

individuals are not only able to leverage their network position to create an impact but this also creates more depth for student involvement within the learning community.

In sum, the findings in this study reinforce the importance of best practices such as community staffing models, value of programs and social events, as well as opportunities for structured academic support. Rooted firmly in the literature, these practices have been long-standing components of an effective learning community; additionally, the results of this particular study also reinforce their value. Well trained and highly involved resident advisors, resident or hall directors, and other stakeholders in the community (i.e. academic advisor, professional-in-residence, faculty director, etc.) possess the ability to positively impact relationship development in significant ways. Related, well-coordinated and executed programming employs effective use of the physical space and creates opportunities for engagement. This interaction is critical in community development to help enhance relationships into more meaningful and dynamic interactions. Finally, coordinated opportunities for academic support, such as tutoring as well as time and space for study group meetings and/or homework, are imperative to ensure the necessary balance of curricular and co-curricular experience within a community. Without the presence of academically-oriented interactions, a learning community can become much like any other social gathering or group. The strategic and intentional incorporation of academic support efforts pays huge dividends for student success, as evidence in both the literature and this study.

APPENDICES

Appendix A

Survey Instrument (Engineering Learning Community Survey, Spring 2014)

Part I – Your Engineering Community Experience

(Survey Page 1 of 4)

| | Strongly Agree | Agree | Neither Agree Nor Disagree | Disagree | Strongly Disagree |
|---|----------------|-------|----------------------------|----------|-------------------|
| 1. I understand the purpose of the Engineering Community within Hamilton Hall. | 5 | 4 | 3 | 2 | 1 |
| 2. I enjoy being in the Engineering Community. | 5 | 4 | 3 | 2 | 1 |
| 3. I have participated in Engineering Community activities. | 5 | 4 | 3 | 2 | 1 |
| 4. The Engineering Community has contributed positively to my experience at Southern State Public University. | 5 | 4 | 3 | 2 | 1 |
| 5. I am friends with students in the Engineering Community. | 5 | 4 | 3 | 2 | 1 |
| 6. Being a part of the Engineering Community has contributed to my academic success. | 5 | 4 | 3 | 2 | 1 |
| 7. I plan to remain involved in the Engineering Community next year. | Yes | | No | | Not sure |

Please continue to the next page for the remainder of the survey.

Part II - Your Engineering Community Network

Your responses are completely confidential. When the data are recorded, it will be by ID number only, and the name corresponding to the ID will be known by the researchers only. No name will EVER appear in any analyses or reports based on this survey. Your responses will be combined confidentially with the responses of other people taking part in the survey.

| 0 | 1 | 2 | 3 | 4 |
|--|---|--|--|---|
| Roster Last Name, First Name | Answer below regarding how well you know other students in this group. Do you know this student? (Yes or No) | For those identified in column 1 as “Yes: Which Single answer best characterizes the relationship between the two of you? 5 – a close friend 4 – a friend 3 – an acquaintance 2 – we haven’t really met 1 – an adversary | For those identified in column 1 as “Yes: How often do you study or do homework with this person? 4 – frequently 3 – sometimes 2 – rarely 1 - never | For those identified in column 1 as “Yes: How often do you eat meals with this person? 4 – frequently 3 – sometimes 2 – rarely 1 - never |
| | | | | |
| <Name> | | | | |
| <Name> | | | | |

| | | | | |
|--------|--|--|--|--|
| <Name> | | | | |
| <Name> | | | | |
| <Name> | | | | |
| <Name> | | | | |

(Survey Page 3 of 4)

| 0 | 5 | 6 |
|-----------------------|---|---|
| Roster | For those identified in column 1 as “Yes: | For those identified in column 1 as “Yes: |
| Last Name, First Name | Does this person COME TO YOU for advice? 2 – yes 1 - no | Do YOU GO to this person for advice? 2 – yes 1 - no |
| <Name> | | |
| <Name> | | |
| <Name> | | |
| <Name> | | |
| <Name> | | |
| <Name> | | |
| <Name> | | |

Part III - Open Response Feedback

| |
|---|
| 1. Do you feel that being a part of the Engineering Community has contributed to your academic success at Southern State Public University? Please explain. |
| 2. Are there any Engineering Community students in particular who helped you succeed academically? Please provide name(s) and explain. |
| 3. Please indicate your cumulative GPA, which includes Fall 2013: |
| 4. Did you ever attend Wednesday Social Hour on Wednesdays in Hamilton Hall? Please describe your experience & impressions of this event. |
| 5. Did you ever attend Tutoring Nights in the Hamilton Hall Classroom? Please describe your experience & impressions of this event. |
| 6. Did you attend the Seminar Series/classes "Modern Challenges of Engineering" hosted by the Engineer-in-Residence? Please describe your experience & impressions of this event. |
| 7. Is there any additional feedback you would like to share about your experience with the Engineering Community? |

Thank you for your participation. You have completed this web-based survey.

Appendix B

Consent to Participate in a Research Study

Social Network Analysis of Southern State Public University's Engineering Living Learning Community

You are being invited to take part in a research study that examines relationship development and success within a learning community. You are being invited because you are a student living in the Southern State Public University (SSPU) Engineering Living Learning Community (Residential College). If you volunteer to take part in this study, you will be one of about 70 people to do so. However, you cannot participate in the research if you are under 18 years of age.

The person in charge of this study is Leslie Woltenberg, UK Educational Policy Studies & Evaluation PhD Student (leslie.woltenberg@yahoo.com).

The purpose of this study is to understand the academic and social peer relationship development within the Engineering Community—and how those relationships may be related to social interaction, campus involvement, and academic success. This research furthers our understanding of how students construct academically and socially beneficial peer relationships over time within a particular environment, which may lead to positive educational outcomes. This study demonstrates for practitioners how they might apply social network analysis to their own campus communities (residence halls, student organizations, classes, etc.) in order to more accurately assess them. The theory, method, and results of this study can help faculty and administrators to create more educationally hospitable collegiate environments for undergraduates that help to foster their social and academic success, both on campus and into their futures.

The research procedures will be conducted at the Southern State Public University. If you choose to participate, you will be asked to complete a brief web-based survey (through Survey Monkey). This survey is entirely voluntary and you may skip questions, you may leave questions blank or partially complete to ensure your comfort. To the best of our knowledge, by participating in this study, you will have no more risk of harm than you have in everyday life.

Your willingness to take part may, in the future, help society as a whole better understand this research topic, and will be used to guide future research in this area. If you decide to take part in the study, it should be because you want to volunteer. You will not lose any benefits or rights you would normally have if you choose not to volunteer. You can stop at any time during the study and still keep the benefits and rights you had before volunteering. If you decide to take part in the study you still have the right to decide at any time that you no longer want to continue. You will not be treated differently if you

decide to stop taking part in the study. There are no costs associated with taking part in the study.

I, Leslie Woltenberg, a researcher at the University of Kentucky will see the information collected for this study. Please be aware, while I will make every effort to safeguard your data once received from the online survey/data gathering company, given the nature of online surveys, as with anything involving the Internet, we can never guarantee the confidentiality of the data while still on the survey/data gathering company's servers, or while en route to either them or us. It is also possible the raw data collected for research purposes may be used for marketing or reporting purposes by the survey/data gathering company after the research is concluded, depending on the company's Terms of Service and Privacy policies.

We will keep private all research records that identify you to the extend allowed by law. However, there are some circumstances in which we have to show your information to other people. We may be required to show information which identifies you to people who need to be sure we have done the research correctly; these would be people from such organizations as the University of Kentucky.

Before you decide whether to participate in the study, please ask any questions that might come to mind now. Later, if you have questions, suggestions, concerns, or complaints about the study, you can contact the investigator, Leslie Woltenberg at leslie.woltenberg@yahoo.com or 859-230-9687. If you have any questions about your rights as a volunteer in this research, contact the staff in the Office of Research Integrity at the University of Kentucky at 859-257-9428 or toll free at 1-866-400-9428.

Sincerely,

Leslie N. Woltenberg, PhD Candidate
Educational Policy Studies & Evaluation, University of Kentucky
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Appendix C

Recruitment Memo & Email for Survey Participation

Engineering Living Learning Community (LLC): Survey

You are being invited to take part in a research study that examines relationship development and success within a learning community. You are being invited because you are a student living in the Engineering Living Learning Community (Residential College). The Southern State Public University's Office of Residence Life has approved this study. If you volunteer to take part in this study, you will be one of about 50 people to do so. However, you cannot participate in the research if you are under 18 years of age. The purpose of this study is to understand the academic and social peer relationship development within the Engineering Community—and how those relationships may be related to social interaction, campus involvement, and academic success. This research furthers our understanding of how students engaged in such a community may lead to positive educational outcomes.

Your willingness to take part may, in the future, help society as a whole better understand this research topic, and will be used to guide future research in this area. There are no costs associated with taking part in the study. You will receive an email in a few weeks titled "Engineering LLC Survey" that will invite you to participate in the web-based survey (the web-link for the study will be provided). The study will take no longer than 15-20 minutes of your time and your response is highly valuable. If you decide to take part in the study, it should be because you want to volunteer. If you decide to take part in the study you still have the right to decide at any time that you no longer want to continue.

Before you decide whether to participate in the study, please ask any questions that might come to mind now. Later, if you have questions, suggestions, concerns, or complaints about the study, you can contact the investigator, Leslie Woltenberg at leslie.woltenberg@yahoo.com or 859-230-9687.

Sincerely,

Leslie N. Woltenberg, PhD Candidate
Educational Policy Studies & Evaluation, University of Kentucky
PHONE: 859-230-9687
E-MAIL: leslie.woltenberg@yahoo.com

Dr. Jane Jensen, Faculty Advisor
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Appendix D

Survey Email Invitation

SOUTHERN STATE PUBLIC UNIVERSITY'S ENGINEERING COMMUNITY SURVEY

Greetings < name> -

You are receiving this email because you are a **Hamilton Hall Resident and a member of the Engineering Community**. You received a letter within the past week regarding this important survey opportunity: **this is the official email to provide your customized survey link**.

A few things you should know before proceeding to the survey:

1. TIME: The survey will take approximately 20 minutes to complete. Please proceed and answer all survey questions honestly & completely. Your responses are INCREDIBLY valuable to our research.
2. PARTICIPANTS: For the purposes of this study, the term "Engineering Living Learning Community (LLC)" is used to describe the community of Southern State Public University engineering/pre-engineering students who live in Hamilton Hall. This includes students in the Engineering Residential College (ERC) & Management And Engineering (MAE).
3. SECURITY: Your responses are completely confidential and will be recorded by ID number only. The name corresponding to the ID will be known by the researcher only. No name will ever appear in any analyses or reports based on the survey. Other survey participants will never see your responses.
4. QUESTIONS?: If you have any questions or concerns about this survey, please contact the researcher directly at the information provided below.

Click this link to proceed to the survey: < web link inserted here>

Thank you for your participation in this important study!

Leslie Woltenberg, PhD Candidate & Principal Researcher
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Appendix E

Survey Email Reminder

ENGINEERING COMMUNITY SURVEY

Hi <NAME>!

The Hamilton Hall Engineering Community y Survey is still available for you.
In 15-20 minutes you can complete the survey and provide valuable information!

<Name>, here is your customized survey link:

Thank you,

Leslie Woltenberg, PhD Candidate & Principal Researcher
Department of Educational Policy Studies & Evaluation
College of Education
University of Kentucky
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Appendix F

Enlarged Figures 1-11

Figure 1: Knowing Network visualization

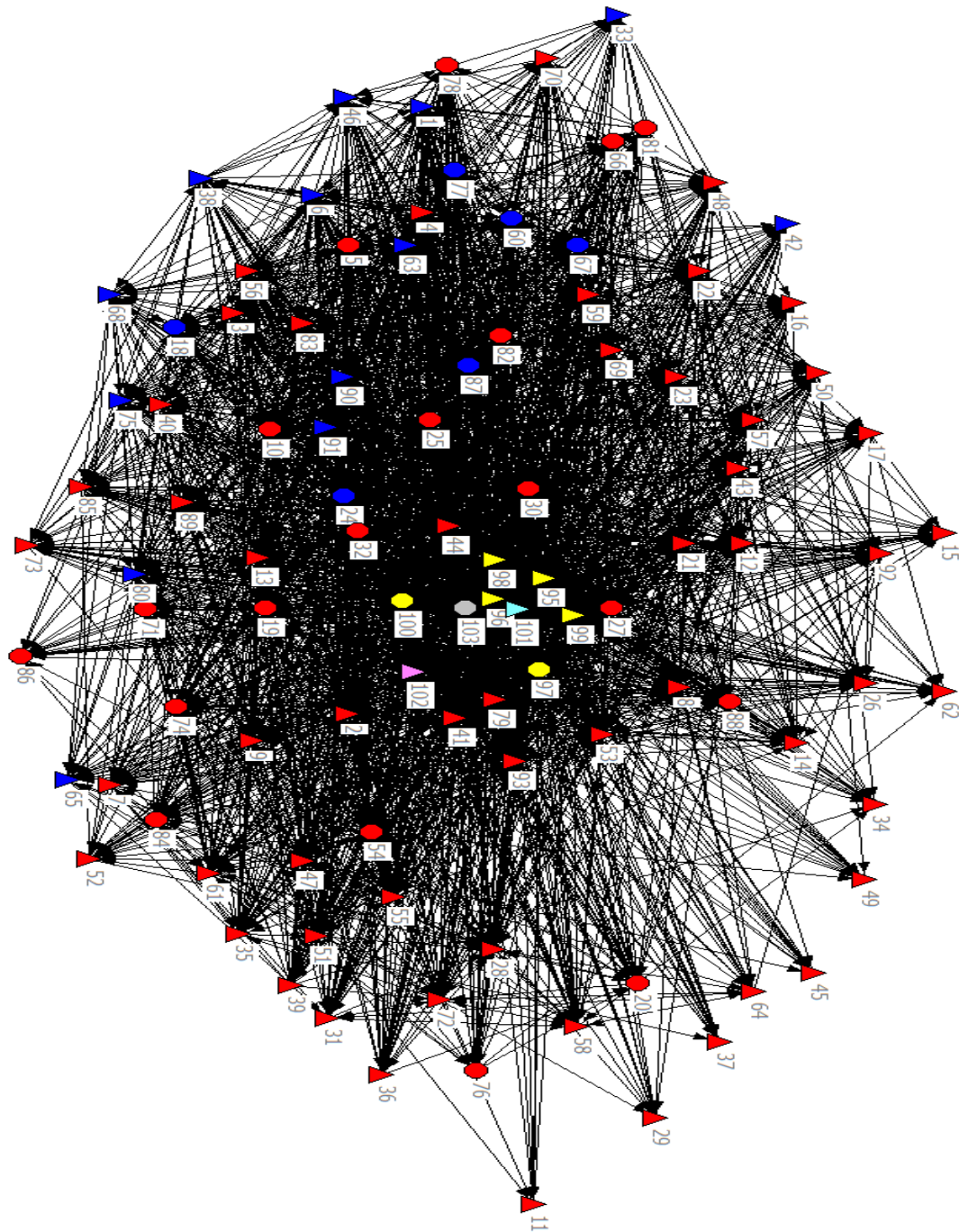


Figure 2: Females-only Knowing Network

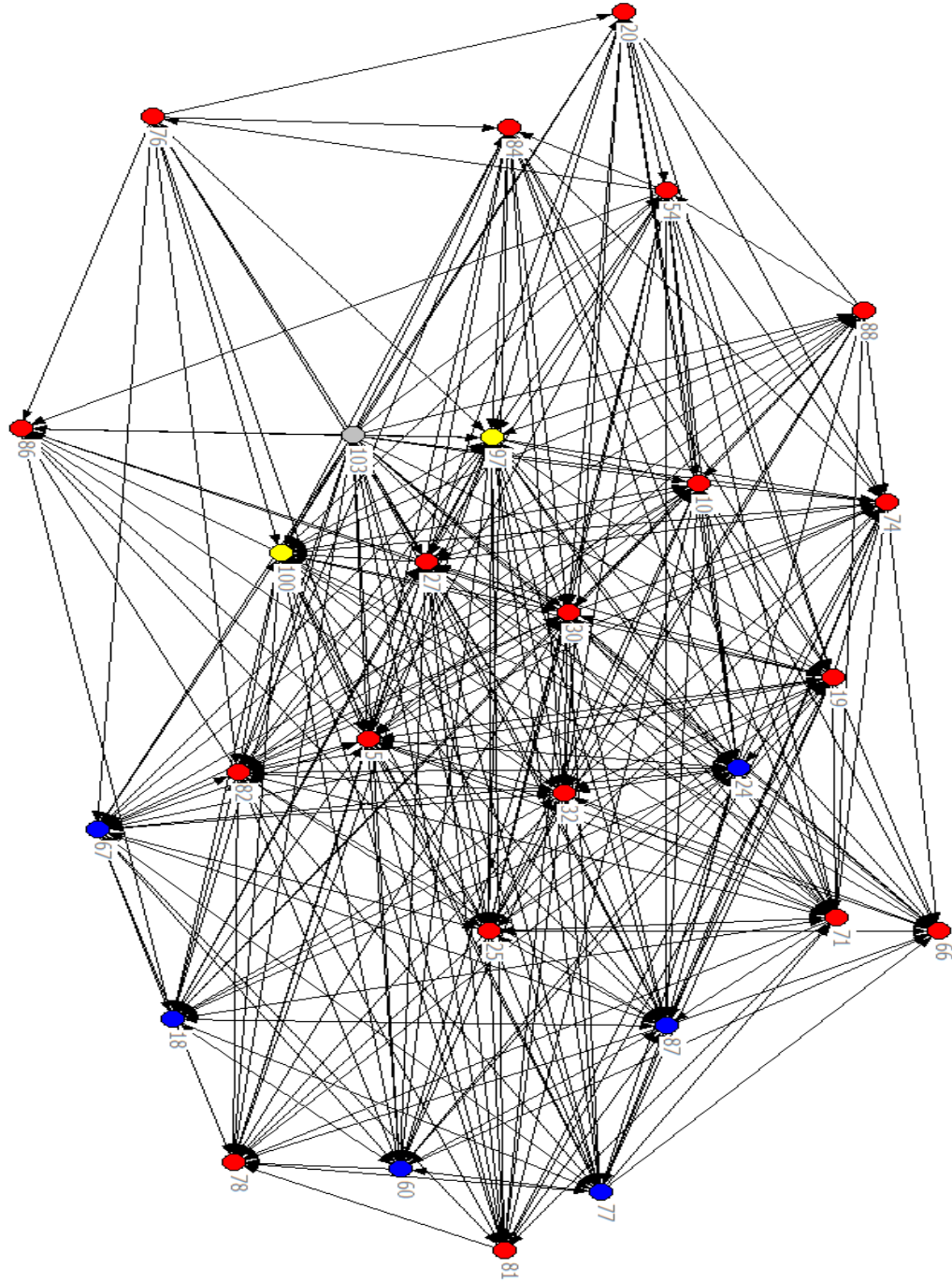


Figure 3: Males-only Knowing Network

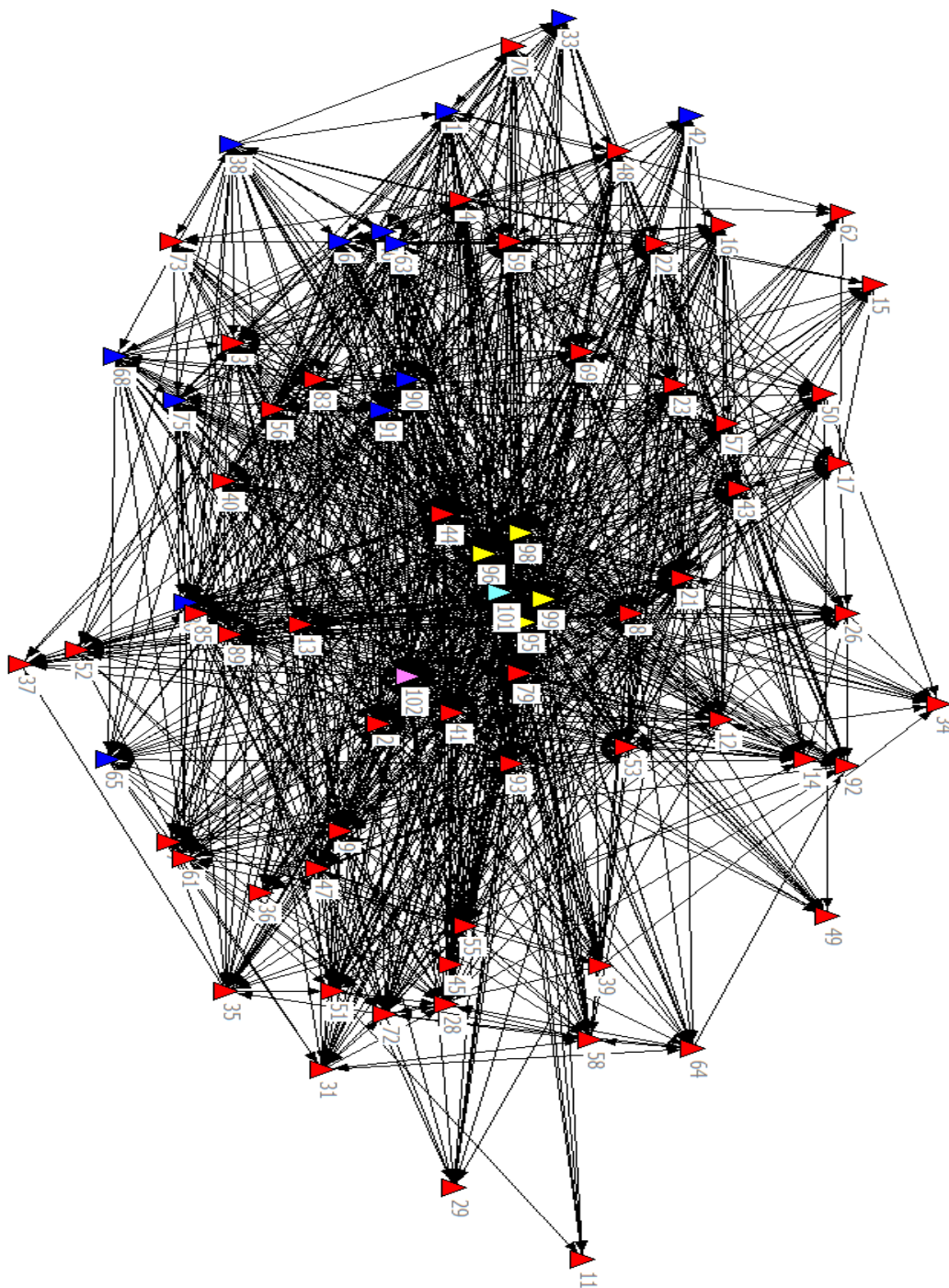


Figure 4: Knowing Network with Strength of Tie Network

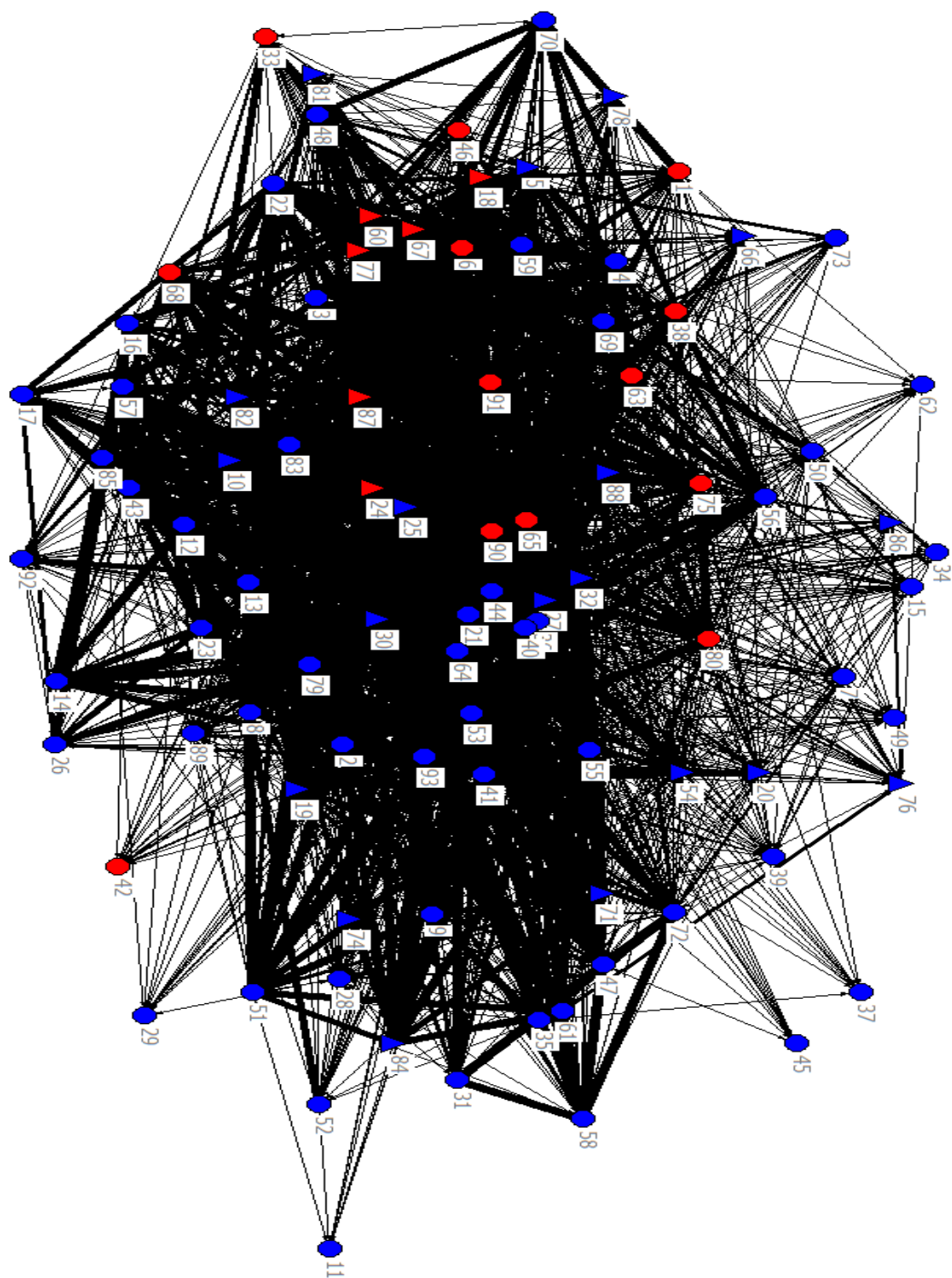


Figure 5: ERC-Only Friends & Close Friends

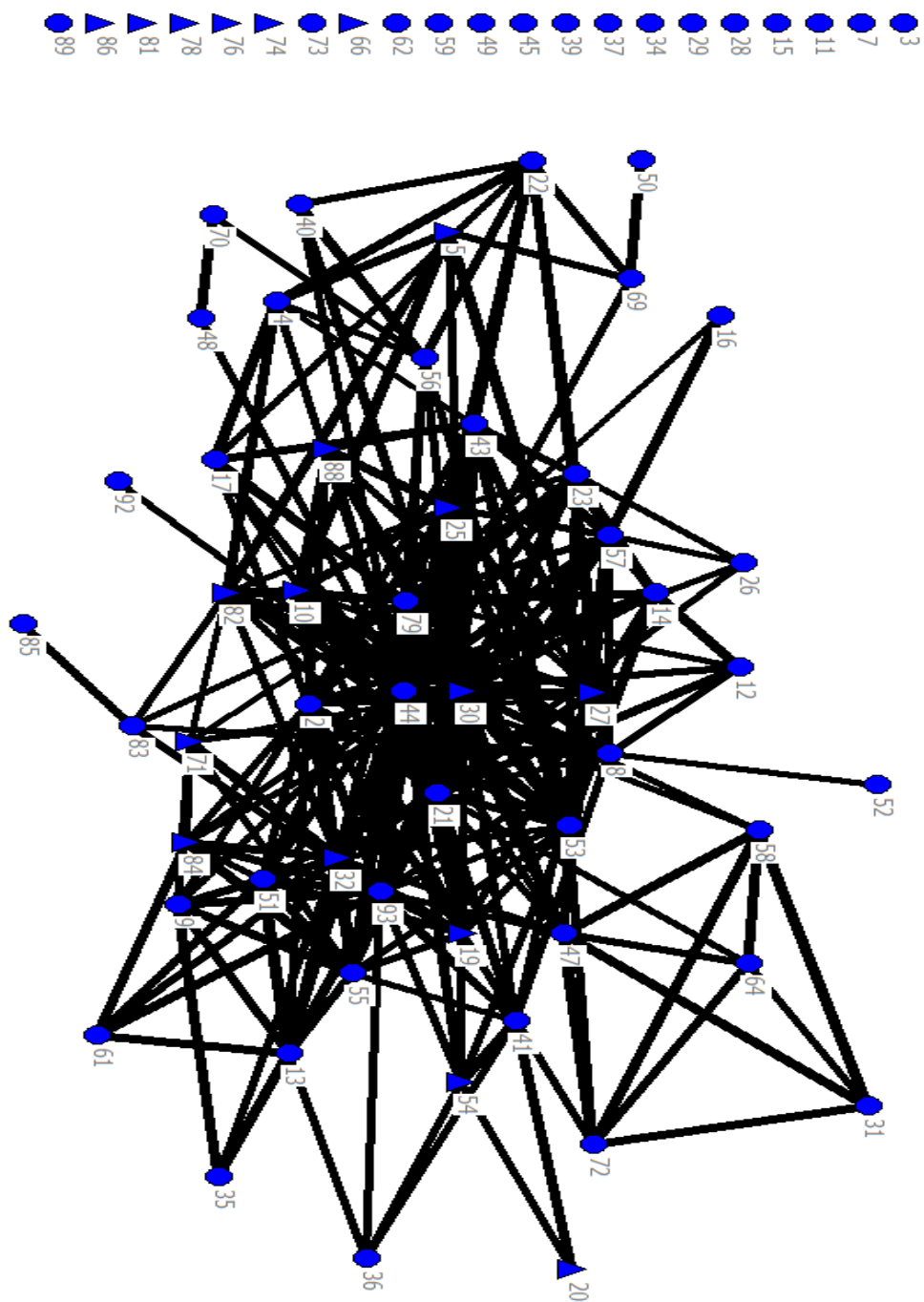


Figure 6: MAE-Only Friends & Close Friends

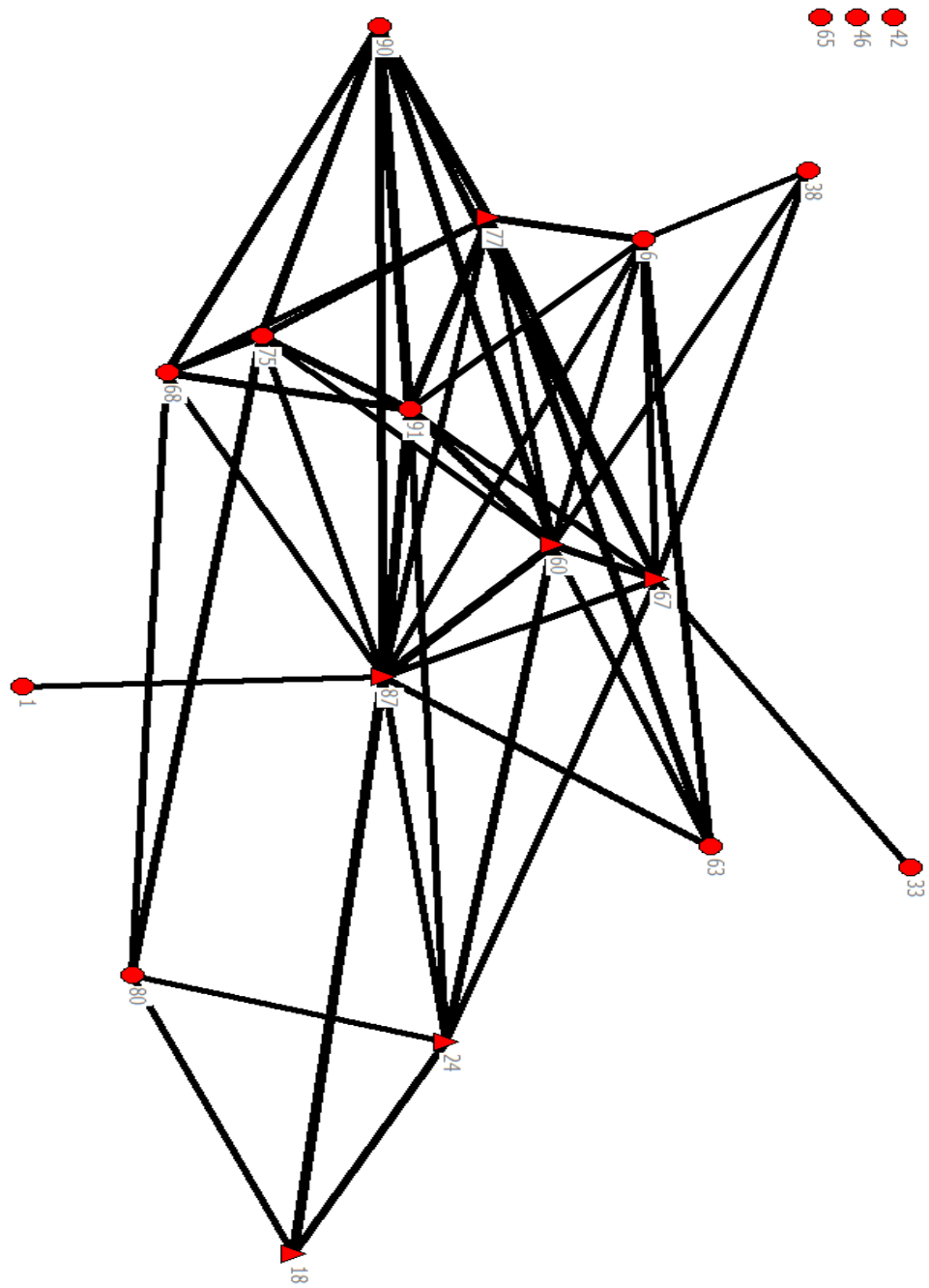


Figure 7: Close Friend Strength Network (ERC & MAE)

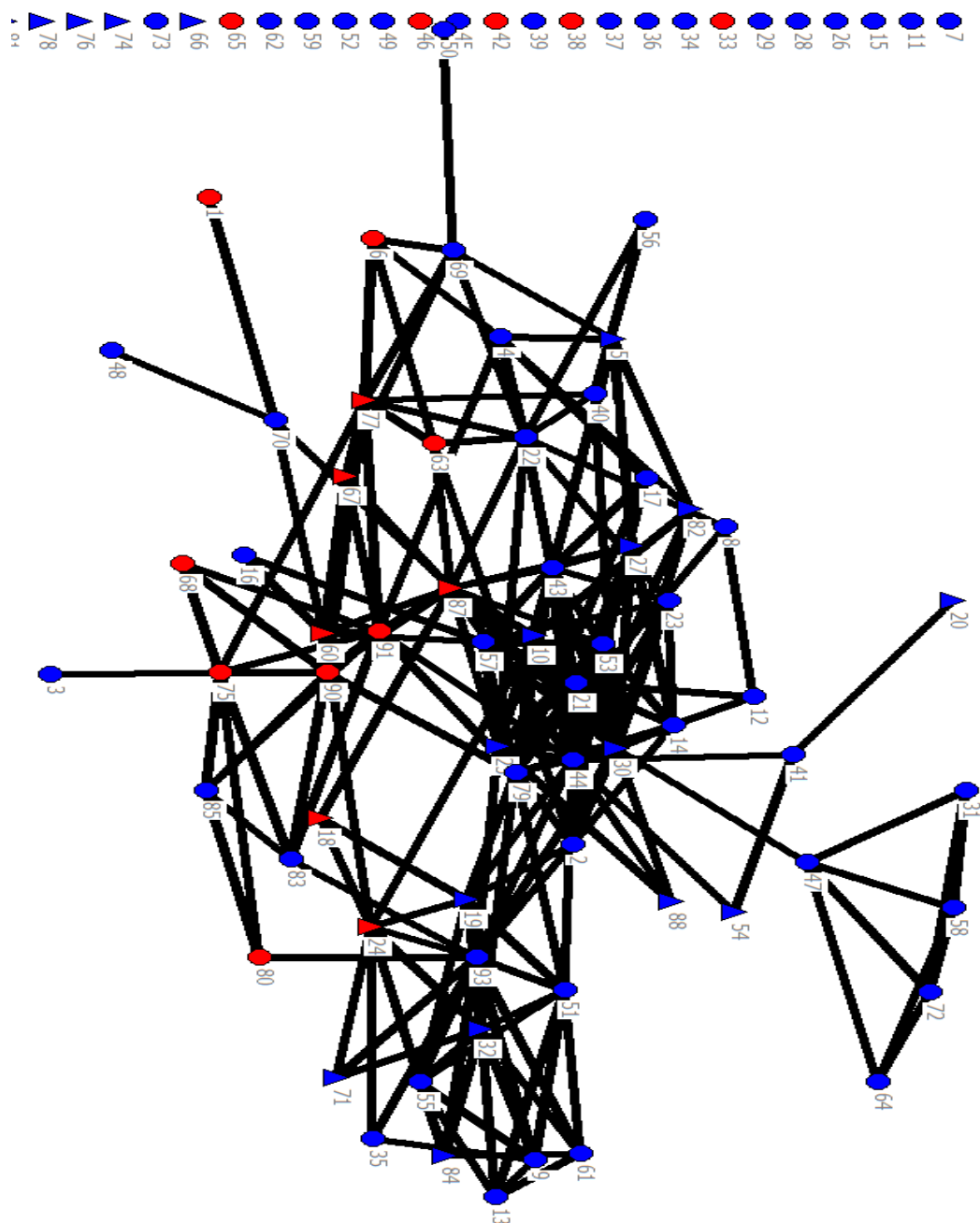


Figure 8: Friendship Network with Centrality

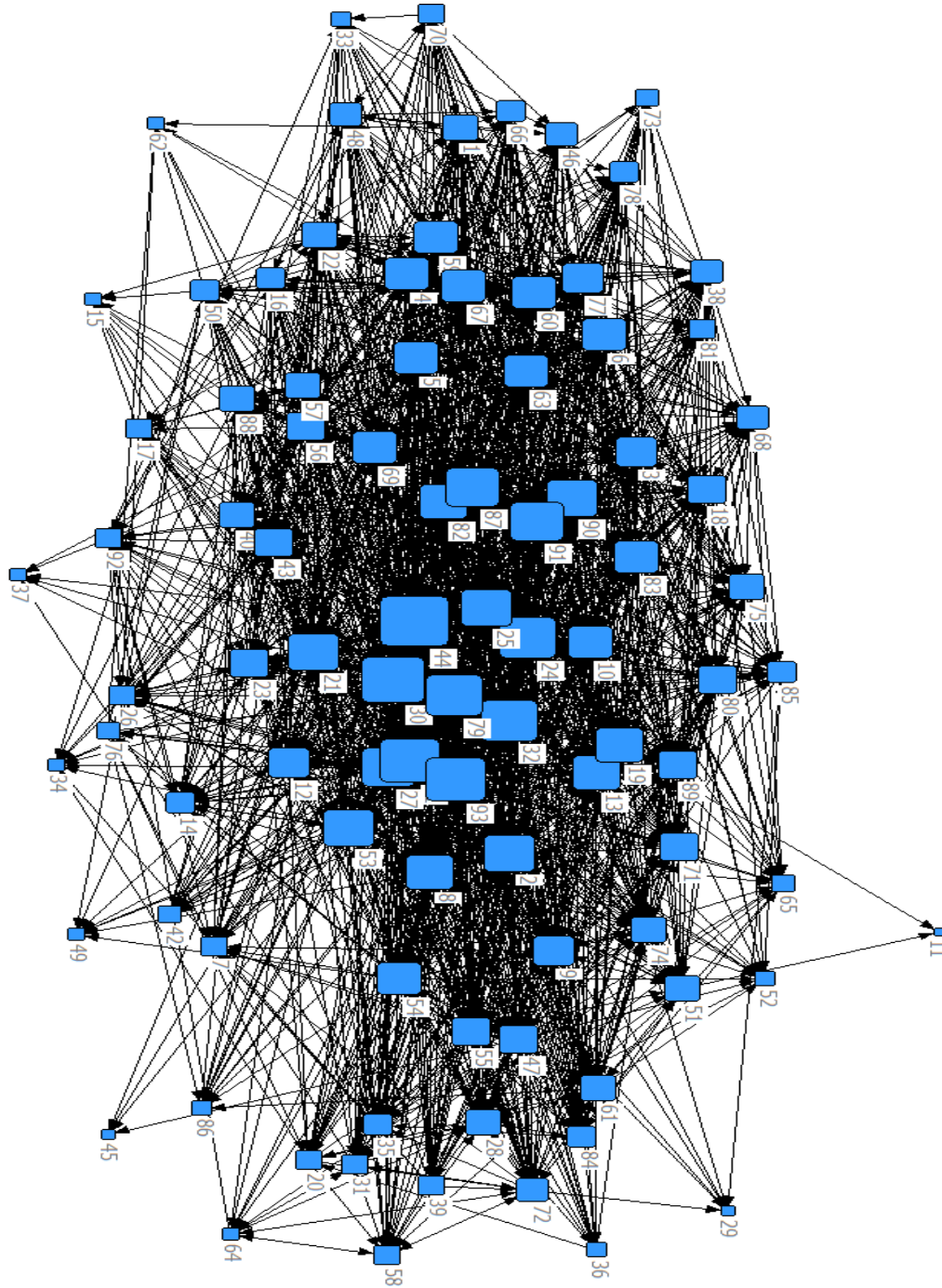
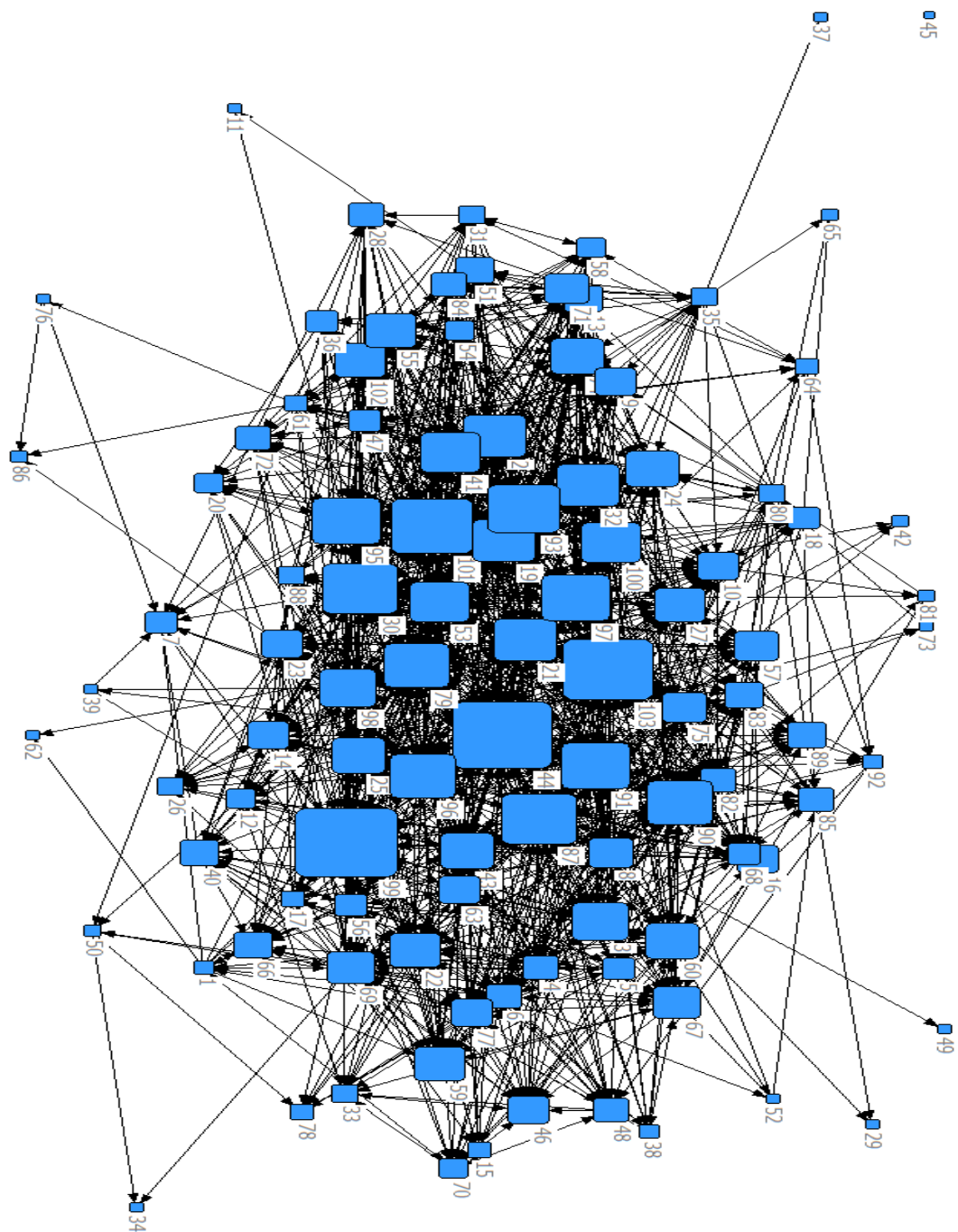
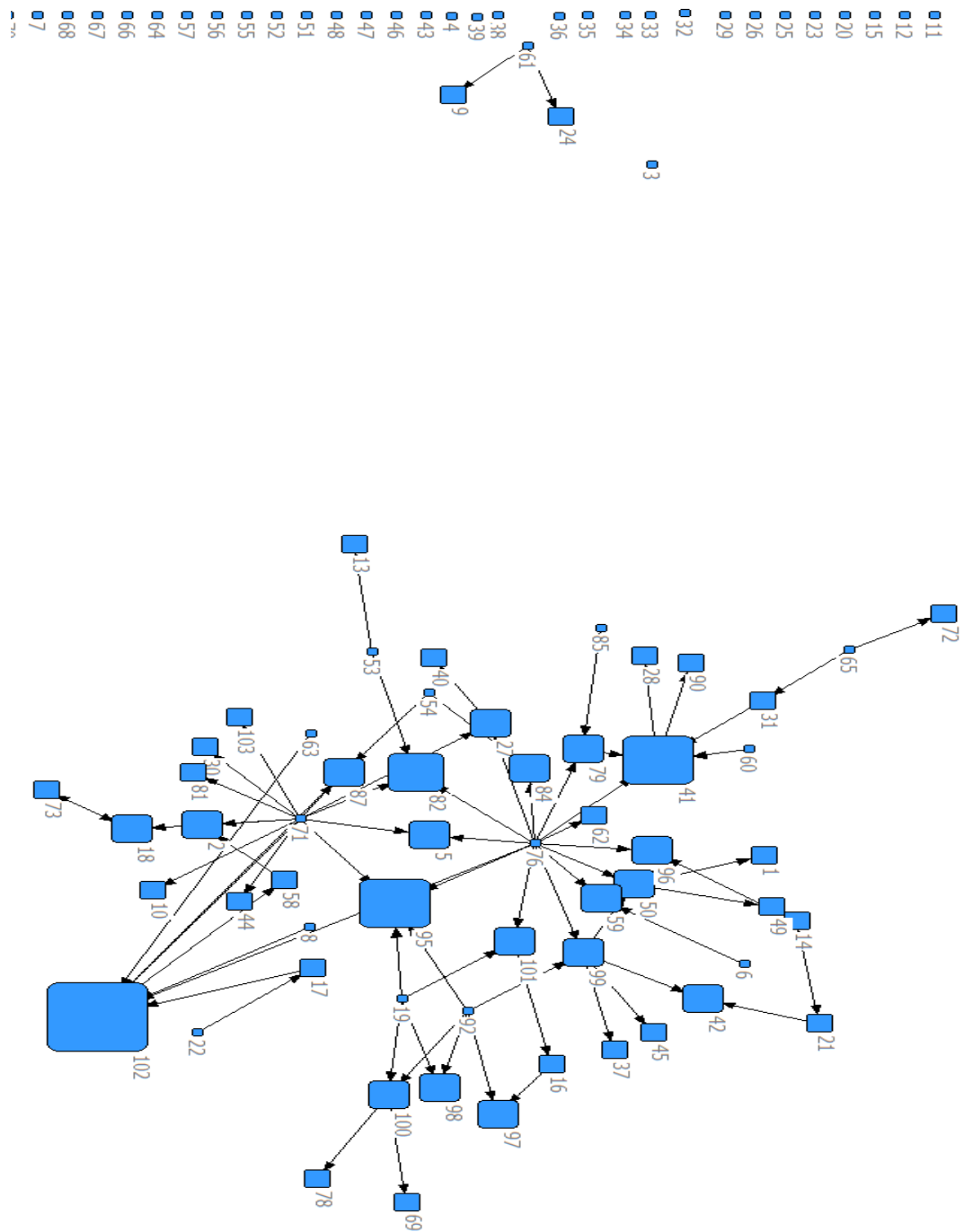


Figure 9: Friendship Centrality



[illegible]

Figure 11: Adversary Centrality



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VITA

Name: Leslie Nicole Woltenberg

Place of Birth: Baton Rouge, LA

Educational institutions attended and degrees awarded:

- University of Kentucky, Bachelors of Arts: Marketing, 2005
- University of Kentucky, Masters of Education: Education Policy Studies & Evaluation, emphasis in Student Affairs, 2007

Professional positions held:

- Registrar, Lexington Christian Academy (August 2012 - Present)
- Associate Registrar for Communications & Publications, University of Kentucky (December 2011 – August 2012).
- Director of Visitor Center, University of Kentucky (December 2010 – December 2011)
- Interim Associate Director of Academic Initiatives & Living Learning Communities Coordinator, University of Kentucky (July 2007 – December 2010)
- Residence Hall Director, University of Kentucky (August 2005 – May 2007)

Scholastic and professional honors:

- Nominated for Editorial Board Membership with the *Journal of The First-Year Experience & Students in Transition*, 2013.
- Southeastern Association of Housing Officers' Outstanding New Professional Award Nominee, 2009.
- Attendant at the Regional Entry Level Institute: Leadership Development Program hosted by Southeastern Association of Housing Officers, 2009.
- UK Division of Student Affairs' Citizenship Award Recipient, 2008.
- UK Resident Student Association's Residence Life Staff Member of the Year Award Recipient, 2003.